The Navy Distributed Engineering Plant (DEP) Bottom Up Review

Building More Efficient Processes and Bridging Communication Gaps

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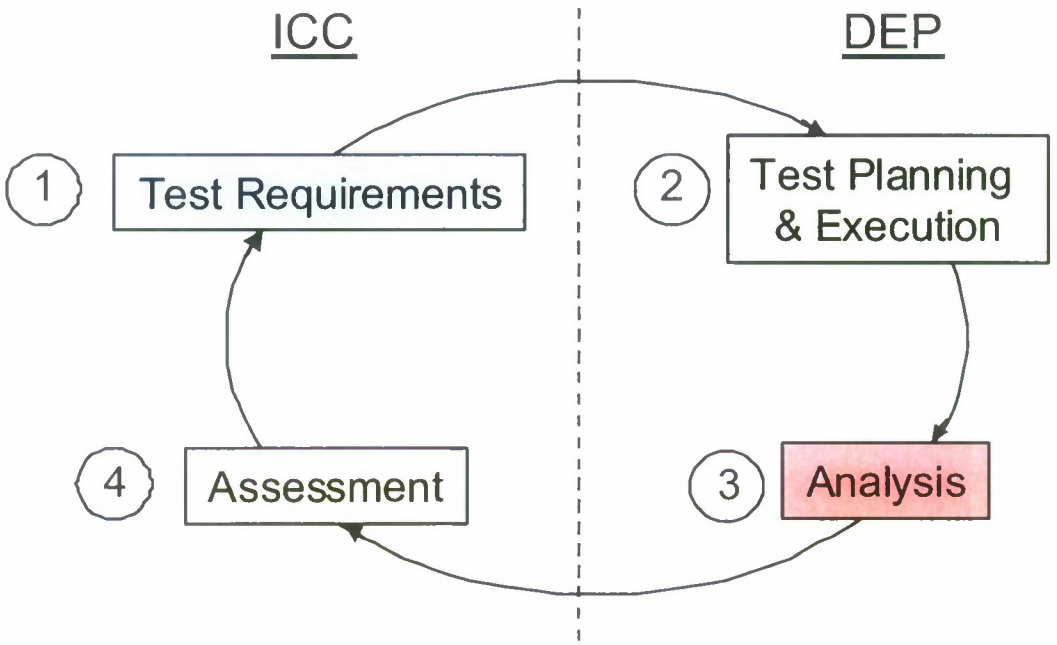
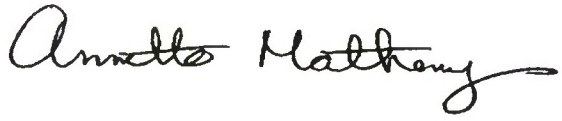


Bottom Up Review

CAB D0018847.A2/Final
April 2009

CNA
ANALYSIS & SOLUTIONS

Approved for distribution: April 2009



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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED *(From - To)*
4-2009	Final	

4. TITLE AND SUBTITLE

The Navy Distributed Engineering Plant (DEP) Bottom Up Review Building More Efficient Processes and Bridging Communication Gaps

5a. CONTRACT NUMBER
N00014-05-D-0500

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER
N/A

6. AUTHOR(S)

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5d. PROJECT NUMBER
N/A

5e. TASK NUMBER
4575

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Center for Naval Analyses
4825 Mark Center Drive
Alexandria, VA 22311-1850

8. PERFORMING ORGANIZATION REPORT NUMBER

D0018847.A2

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

Naval Sea Systems Command
Washington Navy Yard
8th and M St SE
Washington DC 20003

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Distribution Unlimited.

13. SUPPLEMENTARY NOTES

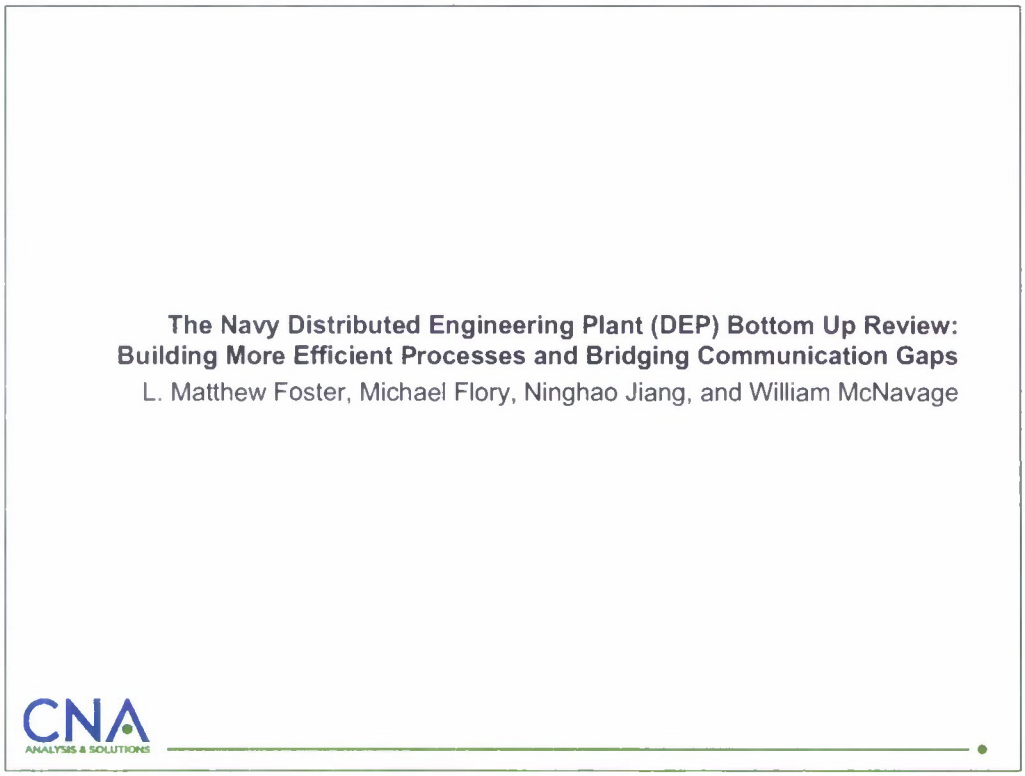
14. ABSTRACT

The Distributed Engineering Plant (DEP) within Naval Sea Systems Command (NAVSEA) tasked CNA to conduct a Bottom Up Review (BUR) of the DEP program. The stated goal was to establish more transparency and traceability of clients' requirements through the DEP testing process. In order to address this concern, we examined the process steps, roles and responsibilities, and information-sharing tools involved in DEP combat system interoperability testing. Our analysis shows that one key to tracing clients' requirements through the testing process is additional engagement with the client through collaboration -- DEP personnel involved earlier in test planning and clients participating later into the testing cycle. We have developed or modified several tools to assist in promoting this collaboration:• Clearly defined roles and responsibilities for key stakeholders during each process step• A matrix that DEP clients can use to make explicit connections between test objectives and test design• Targeted analysis that carries original client requirements through the analysis and reporting phases of testing.

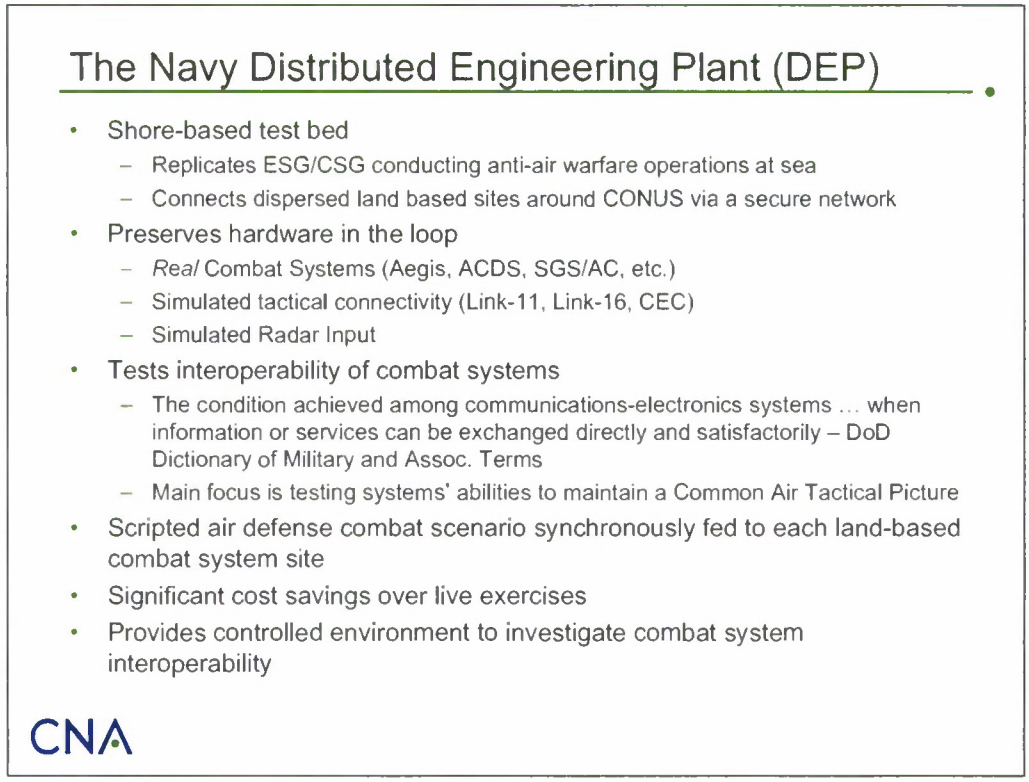
15. SUBJECT TERMS

Interoperability, Traceability, DEP, Targeted Analysis, Process Improvement

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Knowledge Center/Rhea Stone
U	U	U	SAR	104	19b. TELEPHONE NUMBER *(include area code)* 703-824-2110



This report contains the Distributed Engineering Plant (DEP) Bottom Up Review (BUR) for fiscal year (FY) 08. We examined tools that can trace Interoperability Certification Committee (ICC) requirements through the DEP testing and analysis processes. This traceability is a required outcome of the combined ICC and Data Management & Analysis (DM&A) Rapid Improvement Event (RIE); it should improve the overall quality of the testing by improving the documentation that seeds the overall DEP process. We also suggest roles for key stakeholders based on the proposed process improvements that were developed during the ICC and DM&A RIE.



The Navy DEP is a shore-based testing facility that simulates Expeditionary Strike Groups (ESGs) and Carrier Strike Groups (CSGs) conducting anti-air warfare operations at sea. DEP connects distributed land-based sites throughout the United States using secure networks. One major advantage of DEP is the preservation of "hardware in the loop"; real combat systems are tested by examining their responses to simulated tactical radar inputs. The DEP environment can test the interoperability of these combat systems and the ability of the ESG/CSG to maintain a Common Air Tactical Picture.

Operators have minimal interaction with the combat systems during DEP test execution. This minimal interaction will test the actual combat system's ability to react as part of an entire ESG/CSG. The scenarios used within DEP tests are scripted and synchronously fed to each land-based site. The combat systems are connected through shared simulated tactical communication networks (i.e., Link-11, Link-16, Cooperative Engagement Capability (CEC)). The combat systems operate as if they were collocated in an ESG/CSG at sea. The combat systems' reactions are recorded while the scripted scenario is running. The recorded combat system data are later analyzed to identify interoperability issues with the system(s) under test.

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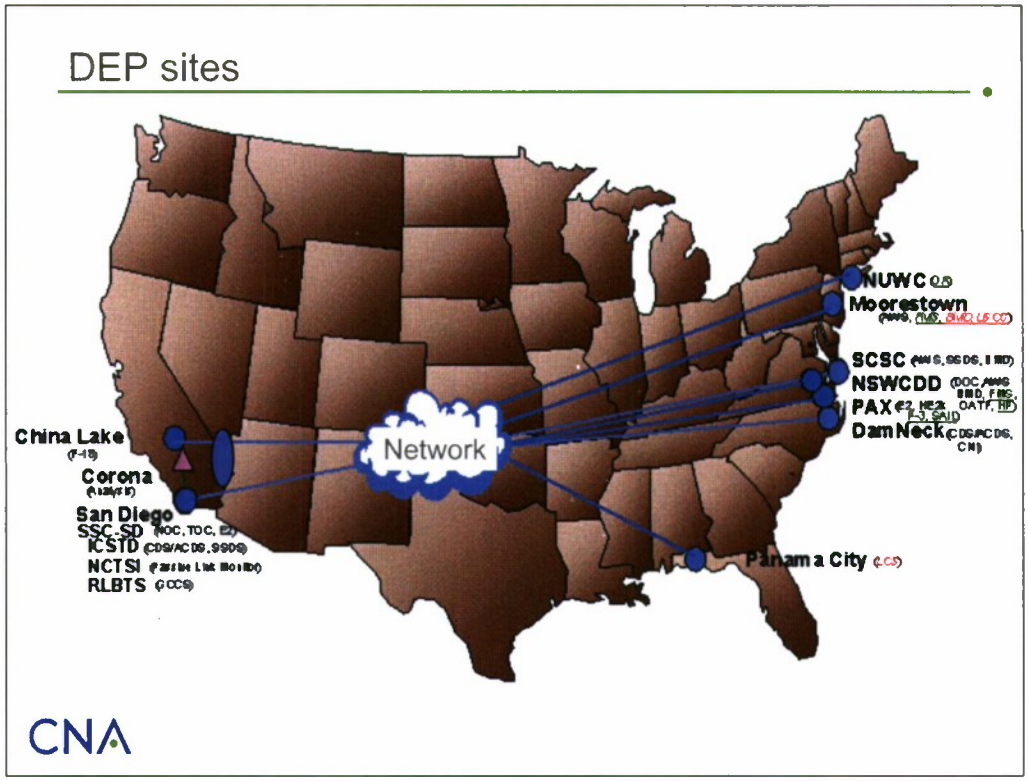
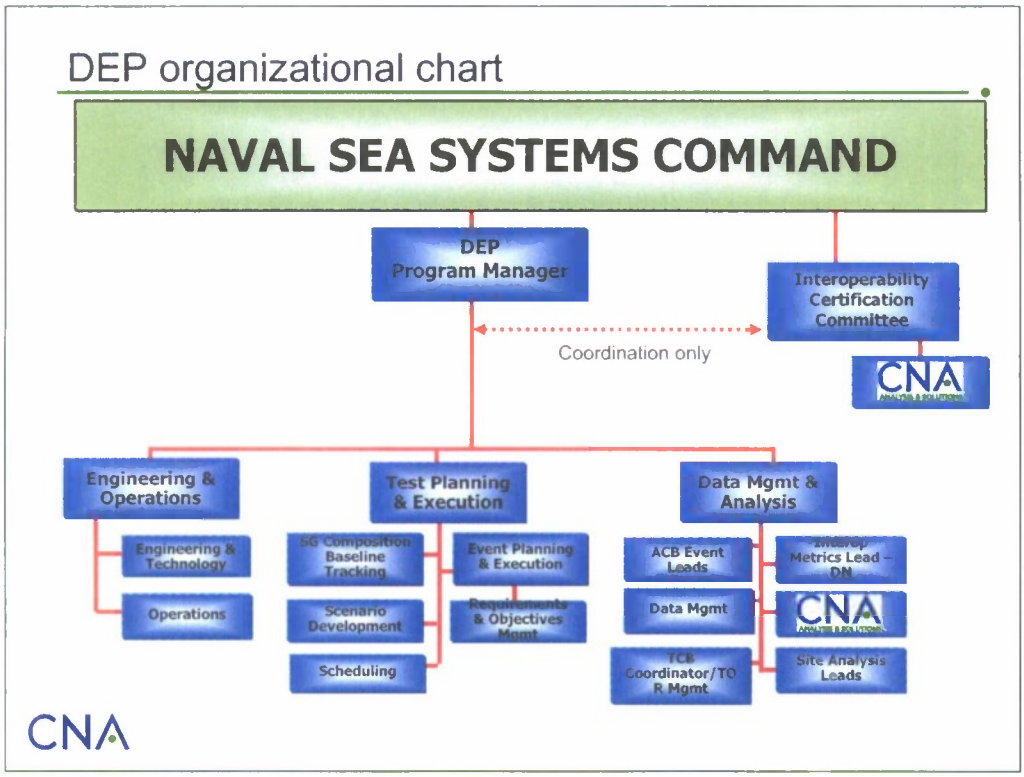
The DEP environment can provide more controlled conditions over a live event in order to investigate the interoperability of combat systems within an ESG/CSG. One of the largest benefits of the DEP is that combat system interoperability can be tested in a simulated, land-based environment, dramatically reducing the cost of conducting these tests using live assets. Additionally, the DEP can test developmental versions of the combat system software in the presence of other networked combat systems. These software loads can be tested at an early enough developmental stage such that developers can detect, and potentially fix or provide work-arounds for issues that may prevent and prohibit a strike force from being interoperable.



The DEP is composed of various combat system laboratories located across the continental United States (CONUS). Most DEP sites are located on the East or West Coasts. Each testing site can house a single or multiple combat systems. The DEP operations center (DOC), located at the Integrated Warfare Systems Laboratory at the Naval Surface Warfare Center Dahlgren Division (NSWCDD) in Dahlgren, Virginia, is the centralized location and hub where all tests are executed. The DOC controls all scenario feeds to the various participating combat system laboratories. Also, the DOC monitors network-wide connectivity during test execution. During a DEP event focused on combat system interoperability, multiple (4 to 5) combat systems will typically participate, in various configurations specific to the test objectives and requirements that must be satisfied.



The Navy DEP program exists under the Naval Sea Systems Command (NAVSEA) 05W42 code. The DEP program, led by the DEP Program Manager, is composed of three distinct functional areas: Engineering & Operations (E&O), Test Planning & Execution (TP&E), and Data Management & Analysis (DM&A).

The E&O functional area is responsible for maintaining network fidelity and improvements, DOC management, scenario drivers, and site management for each DEP testing event. Also, E&O is responsible for ensuring that each testing site has the proper security accreditation in order to establish connectivity to the DEP network and participate in an interoperability assessment test.

The TP&E functional area plans each DEP test event in addition to scheduling the laboratories needed to execute the events. TP&E also hosts the Test Director (TD), who is responsible for test execution. TP&E works closely with E&O to develop and maintain testing scenarios that examine various interoperability issues.

The DM&A functional area is responsible for the management of data recorded at participating combat system laboratories and the DOC to ensure that the data set is complete, valid, and suitable for post-event analysis. Also DM&A is responsible for the completion of post-event analyses to support interoperability assessment. Finally, DM&A assembles all valid interoperability issues discovered both during test execution and post-event analysis and presents those findings to the DEP PM and ICC.

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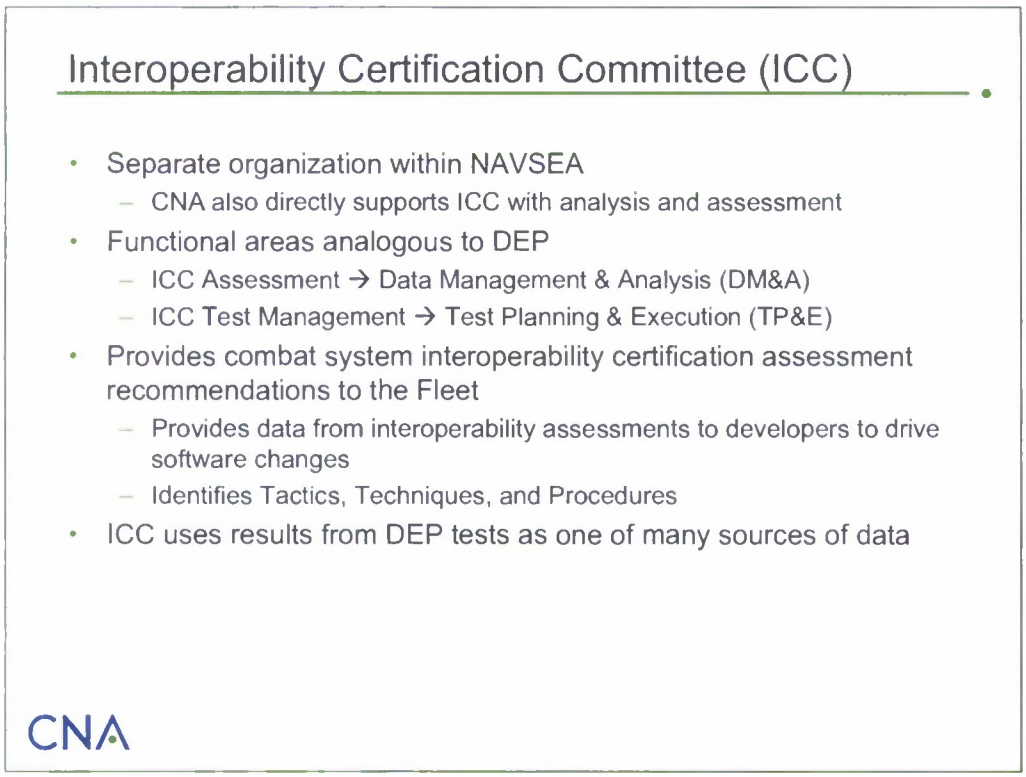
The DEP PM is CNA's government sponsor, and the PM historically has tasked CNA to support the DM&A functional area. CNA has provided support in the form of analysis focused on interoperability metrics [1]. In addition to this role, CNA has frequently been involved in test planning by participating in Test Planning Working Groups and by reviewing test procedures. Further, CNA has been present for the execution of numerous DEP interoperability tests.

While the DEP functional areas are responsible for interoperability assessment testing execution and analysis, the ICC is the driving force that determines which systems should be brought into the DEP to be tested. The ICC is also responsible for fusing analysis provided from DEP test results into a high-level interoperability assessment. The ICC works with TP&E to determine the necessary combat systems needed for test execution.



The Interoperability Certification Committee exists as an organization within NAVSEA separate from the DEP. ICC membership spans various government and contractor organizations, and its primary role is to determine whether a combat system and its related subsystems have met various functional requirements necessary to interoperate with an ESG/CSG. CNA also directly supports the ICC with analysis and assessment. The ICC is supported by eight functional leads with an overall lead or chairperson. The ICC functional areas are the following:

- Interoperability Certification Requirements
- Interoperability Assessment
- Interoperability Test Management
- Systems Engineering
- Fleet Operations
- Fleet Reporting
- Force Safety
- Navy Link Certification.

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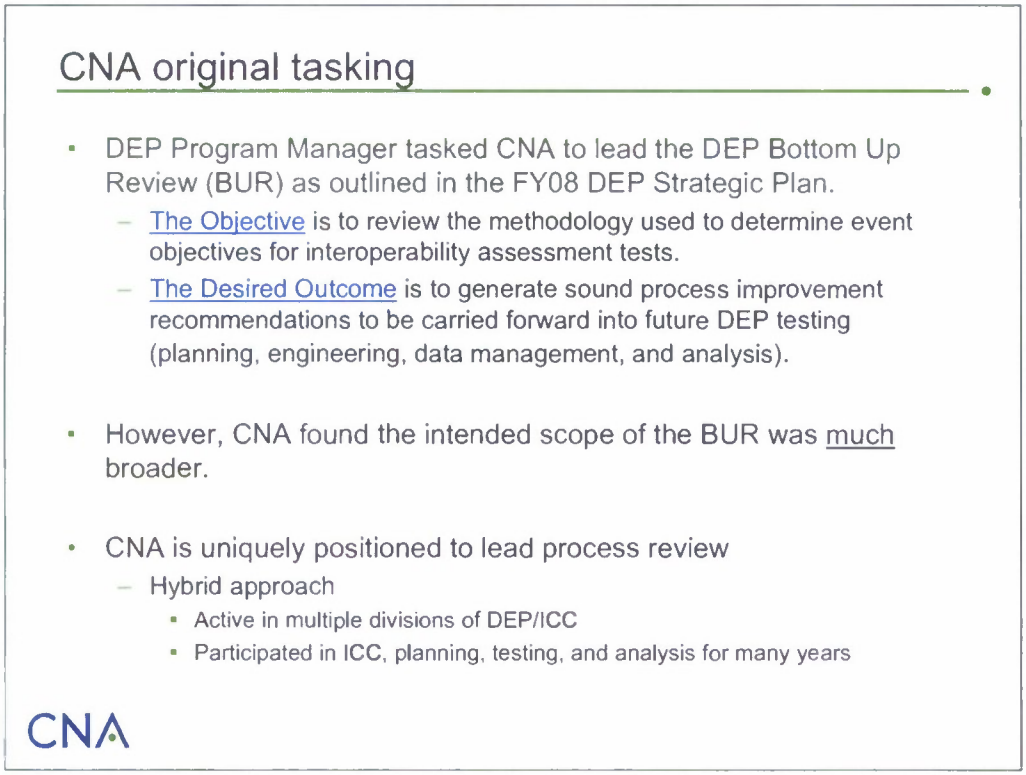
Many of these ICC functional areas are analogous to some of the DEP functional areas. The ICC Assessment's counterpart within DEP is DM&A, and the ICC Test Management's is TP&E. The ICC does not conduct the actual testing; they request that interoperability assessment tests be performed within the DEP environment and other testing programs, such as Warfare Systems Integration and Interoperability Testing (WSIIT) and Navy Center for Tactical Systems Interoperability (NCTSI).

The goal of the ICC is to enable an all-inclusive approach to understanding the interoperability requirements of Navy systems, defining certification criteria based on operational, performance, and programmatic requirements. Also, the ICC links the certification process to systems engineering efforts and also the ICC assesses the warfare system interoperability performance and risk from the technical and operational perspective, including effects at the Force level. Finally, the ICC works with the Capabilities and Limitations (C&L) program to ensure trainers, sailors, and staffs are aware of the interoperability characteristics of the various platforms and collections of platforms. It is the committee's mission to ensure work-arounds and that the tactics, techniques and procedures (TTPs) regarding these are distributed and understood [2].

Since the ICC was stood up in 2005, the interface between the ICC and the DEP functional areas has faced various organizational and communication challenges. Many of these issues have resulted in tests that were not executed or analytic results that did not align with the expectations of the ICC. CNA has observed many of these issues when working with both the DEP and the ICC, and we have been tasked to resolve known communication gaps and offer a suite of tools to help improve the overall interoperability assessment test process. We will elaborate more on specific issues later in this document.



The DEP Program Manager in NAVSEA tasked CNA to support the DEP BUR as outlined in the FY08 DEP Strategic Plan. The initial DEP BUR objective was to review the methodologies used to determine DEP test objectives. However, CNA found the intended scope of the BUR was much broader and required creating traceability within the entire testing process from the initial ICC test request to the final brief delivered by DEP DM&A to the ICC and DEP Program Manager. The ICC only provides test objectives to the DEP prior to test planning rather than providing the full scope of both test objectives and the requirements they satisfy. This practice has caused several disconnects in both the test and analysis process for various interoperability assessment tests that resulted in analysis that did not support the needs of the ICC.

The DEP test objectives are proposed by the ICC Test Management and handed over to TP&E for event planning through a test planning guide. This test planning guide is currently an informal document that is passed from the ICC Test Management to the TP&E lead prior to the first test event planning meeting. This planning guide represents the first step in establishing organizational traceability. This test planning guide needs to directly connect the ICC requirements and motivations to the proposed test objectives. Then with a developed test planning guide, the DEP functional areas can connect DEP planning, engineering, and data analysis to the initial ICC test planning guide and objectives.

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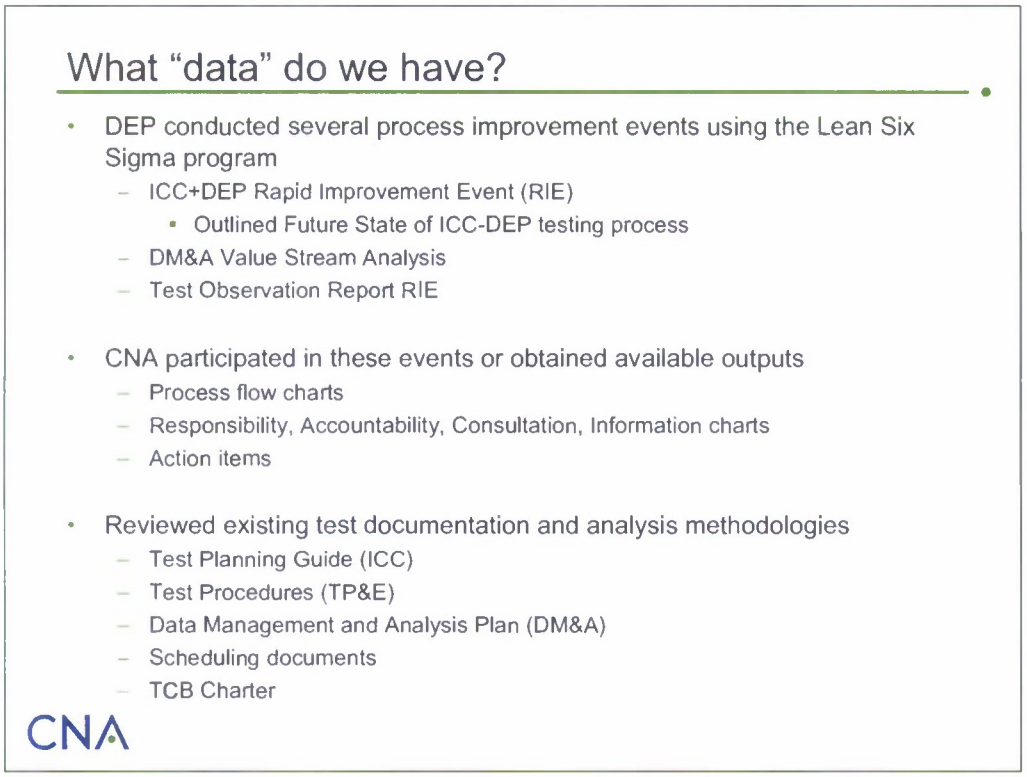
The final BUR goals are to generate process improvement recommendations that will help create and restore organizational traceability such as with a formal ICC test planning guide. CNA is uniquely positioned to lead the BUR process because historically CNA has worked with each DEP functional area as well as had direct support and insight into the ICC. CNA's ability to cross functional areas will help in creating process improvements that will allow the DEP and ICC to be successful in future testing events.



As we discussed earlier, the FY08 DEP strategic plan calls for a review of the methodology used to translate high-level ICC requirements into test objectives that will be tested within the DEP. CNA was tasked to provide a method for tracing test objectives back to the original high-level ICC requirements. Several process improvement events fed into the DEP BUR. First, the DEP DM&A functional area conducted a Value Stream Analysis (VSA), a process improvement and streamlining event, in mid-2007 to determine which areas of the testing process could be improved. DM&A concluded from the VSA event that several additional streamlining events should occur with various stakeholders from across the DEP organization. As a result, the ICC and DM&A conducted a Rapid Improvement Event (RIE). This RIE critically reviewed the current ICC processes that seed DEP interoperability assessment tests and also reexamined steps within the actual DEP testing process. These process improvements stemmed from a Navy-adopted program called Lean Six Sigma. Lean Six Sigma combines two improvement trends: making work better and making work faster. The idea behind Lean Six Sigma is identifying gaps in processes and closing those gaps through communication and collaboration within the organization [3].

During the RIE, the ICC, with input from the DEP Functional Leads, created a revised testing process denoted as the Future State. The proposed process Future State was built off of input and recommendations made during the RIE execution by DEP functional leads, ICC members, and the DEP program manager. The Future State, which will be discussed in more detail later, outlines the work flow

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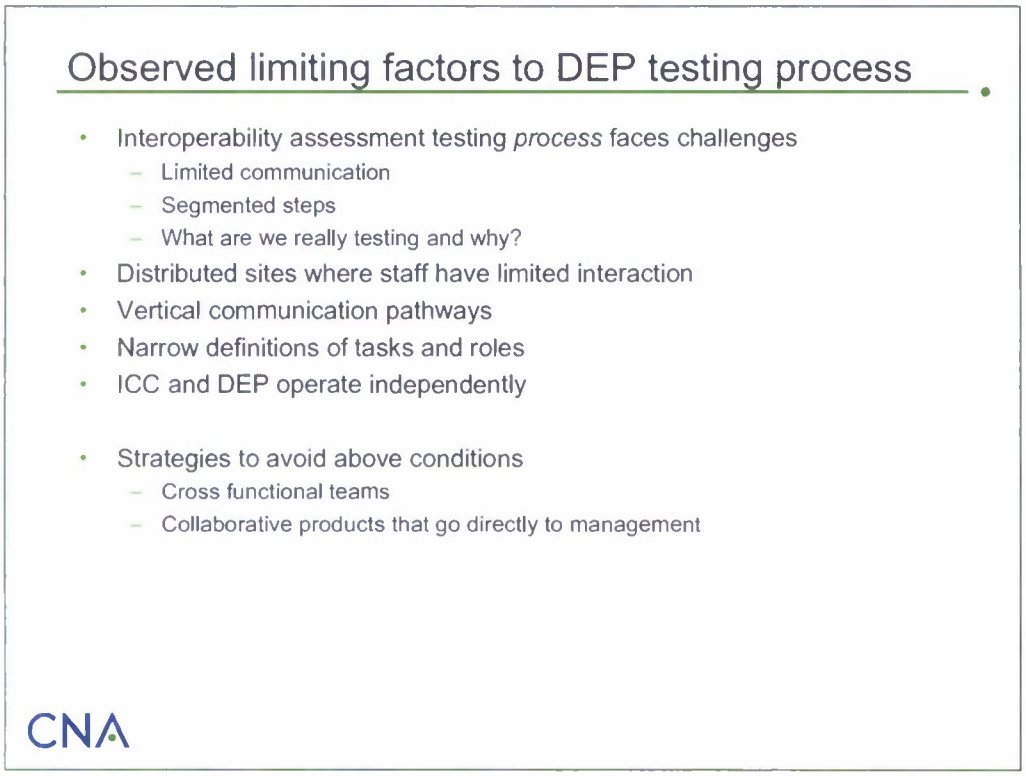
from the initial ICC test request through the delivery of test results by DEP personnel to the ICC. The ICC/DM&A RIE offered a framework for CNA to conduct the BUR. The RIE outcomes provide CNA with a set of guidelines that have been agreed upon by both the ICC membership and DEP functional areas.

In an attempt to leverage existing testing materials so that the ICC and DEP could connect recommended improvements to current products, CNA examined existing test documentation and analysis methodologies. We determined which content could be preserved and which content should be eliminated in order to establish traceability between ICC test requirements and test objectives. CNA reviewed the ICC test planning guides that are created by the ICC Test Management and passed to DEP. The ICC Test Planning Guide highlights the test configurations and setups that would allow the ICC to assess interoperability with a new combat system baseline. Other documents reviewed during the DEP BUR were the Test Procedures created by TP&E, the Data Management and Analysis Plans (DMAPs) to understand analysis methodologies, various scheduling documents, and finally the Test Control Board (TCB) Charter [4]. The TCB charter is the backbone of the entire interoperability assessment process, thus it was important to ensure that the proposed Future State aligns with the TCB process of managing DEP scheduling and programmatic reviews. The TCB is composed of members from both DEP and ICC. It meets periodically throughout the year to determine which ICC-requested tests the DEP will be able to accommodate.



While conducting the BUR, CNA collected data and observations that highlighted needed areas of improvement for both the ICC and DEP functional areas. First, the interface between DEP and the ICC is disconnected and creates limited communication between the two entities. This disconnect drives many fundamental misunderstandings when it comes to both test execution and analysis. The goal of the DEP BUR is to help address these misunderstandings by establishing traceability from the ICC Test Planning through the DEP testing and analysis.

Next, limited cross functional communications within the DEP functional areas occur partly due to the geographically distributed nature of the organization where staff may have limited interactions. CNA reviewed some strategies to help avoid these communication pitfalls such as establishing cross functional teams and generating collaborative products across all necessary functional areas within both the DEP and ICC that are passed directly to the program management. These cross functional teams include participation by both the DEP and ICC and allow all functional areas in both entities to be more invested as stakeholders in the interoperability assessment testing process. This suggested process change introduces a moderate paradigm shift from the current interoperability assessment testing methodology should help eliminate many of the communication gaps across functional areas and also to higher program management.

Finally, the ICC and DEP functional areas cannot continue to operate as independent organizations. For both the ICC and DEP programs to remain

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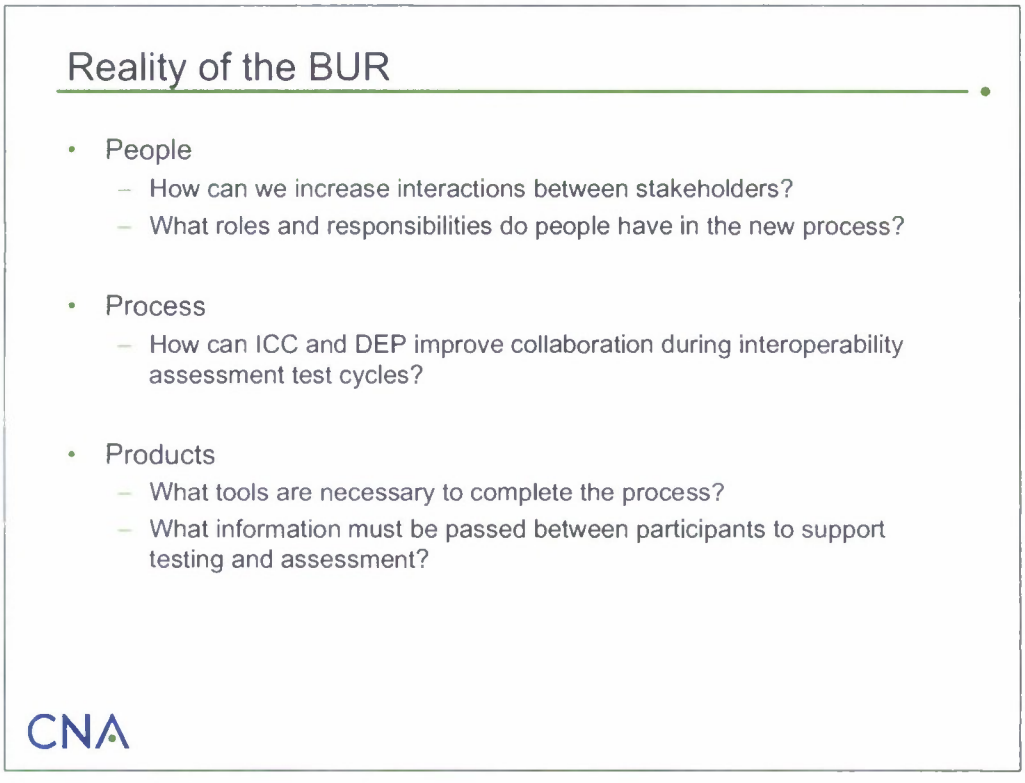
relevant to US Naval Fleet Forces, collaborations must be established and maintained especially in situations where resources may be constrained but the complexity and duration of future testing events increases (i.e., DEP is required to do more with less).

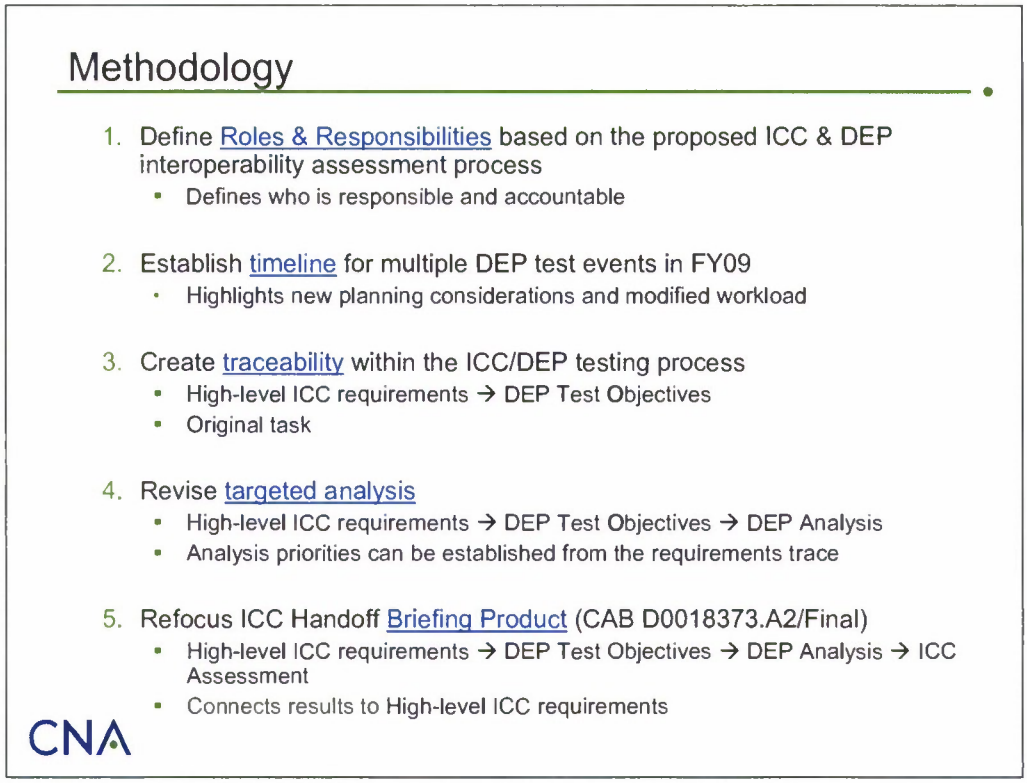


For the DEP BUR to be successful, CNA had to address several communication barriers and process improvements that fall into three categories: people, process, and products that are included in each DEP functional area along with the ICC. Many of the communication barriers and impediments to a successful interoperability assessment testing process can be addressed by dissection of the RIE proposed Future State process.

People – The proposed Future State process created from the RIE events requires involvement by all DEP functional areas earlier in the ICC planning phases, along with requiring additional ICC oversight during DEP test planning, analysis, and reporting to the program management. During the ICC RIE Future State development, there was insufficient time allowed for the specific roles and responsibilities to be defined. As a result, CNA has collaborated with the ICC and DEP functional leads to make recommendations on these roles and responsibilities in the Future State.

Process – The Future State process improves the limited communications between the DEP functional areas and the ICC by increasing their interactions during the entire interoperability assessment testing process. These increased interactions in the Future State process should allow for better information exchange between all stakeholders.

Products – CNA examined possible improvements to existing tools that would allow traceability from requirements to test objectives to be established.



CNA, DEP, and ICC have worked to develop several products and recommendations for improvements to interoperability assessment testing process while completing the BUR. In particular, we examined those areas that require increased collaboration between the DEP and the ICC.

First, CNA collaborated with ICC members and DEP functional leads to establish the roles and responsibilities (R&R) for the RIE Future State process. The R&R recommendations were necessary because time constraints during the DM&A/ICC RIE execution did not permit the original completion of this task. This is a critical step in the implementation of a recommended improved process. As part of the BUR, these R&R recommendations were proposed for every process step in the ICC/DM&A Future State. The responsibility and accountability charts will be examined later in more detail.

Then, the DEP PM requested that CNA demonstrate the effects of applying the Future State to one entire FY. In response, we created a detailed timeline using all existing and proposed DEP and ICC process recommendations. This timeline could help assist in setting milestones and deliverables for upcoming events. The timeline makes visible overlaps in workloads across tests that are not obvious when considering a single event.

The most critical connection that needs to be made is in the handover of test planning materials from the ICC to all DEP functional areas. The main improvement at this ICC/DEP interface is creating a high level ICC master requirements trace that addresses the original scope of the BUR. The requirements trace will demonstrate

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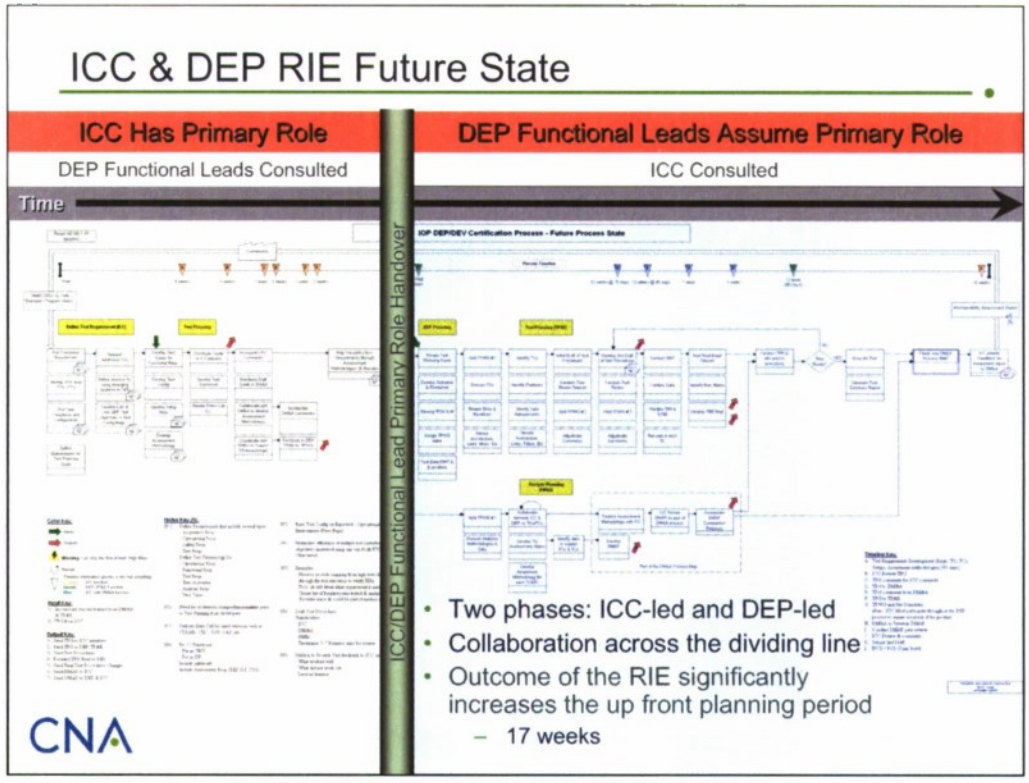
traceability from the ICC requirements to the DEP test objectives and will allow all stakeholders from the ICC and the DEP to better understand the requested ICC test cases and test objectives. CNA created a traceability matrix that maps ICC requirements to an existing set of interoperability assessment test objectives.

Also, we propose a revision of the DM&A targeted analysis methodology. The targeted analysis builds upon the requirements trace matrix and connects purposed targeted analytical techniques to both the test objectives and the underlying high-level ICC requirements. The targeted analysis can allow DM&A to conduct a more focused analysis around the ICC test objectives and will establish analysis priorities that better fit the ICC needs.

Finally, a revised, simplified handoff briefing that can be used as a template for delivering test results to the DEP PM and the ICC has been developed [5]. Some of the suggestions for this revised handoff brief involve elements that demonstrate traceability from analytic results back to ICC requirements. The interoperability issues that are reported out to the DEP PM and ICC in the handoff brief should show a direct connection to the initial ICC high-level requirements. The brief is also restructured for simplification in order to accurately deliver important interoperability issues discovered within the DEP testing to the ICC and DEP Program Management.



Much of the BUR analysis focuses heavily on the beginning of the testing process during the ICC planning stages. As we stated on the data sources slide earlier, a product of the DM&A and ICC RIE was an improved Future State process map. The Future State process diagram shown on the slide above, was produced collaboratively by the ICC and DEP. We have generated a larger, more readable version of the Future State in Appendix G.

The entire Future State can be divided into two distinct phases with the ICC and DEP trading off on the primary role responsibility as highlighted in the slide above. The ICC planning phase is the portion of the process diagram that is on the left side of the handover division line. This line represents where the primary responsibility transitions from the ICC to the DEP in the overall interoperability assessment test process. In the earliest portion of the Future State timeline, the ICC has the primary responsibility for selecting those high-level warfare requirements that are suitable to be tested in the DEP.

Historically, the ICC test management has not required participation by the DEP functional leads in the early planning phases. Now, with the Future State, the DEP functional leads are established as stakeholders early in the ICC test planning process as a check and balance to ensure that proposed requirements can be tested and sufficient data can be collected within the DEP.

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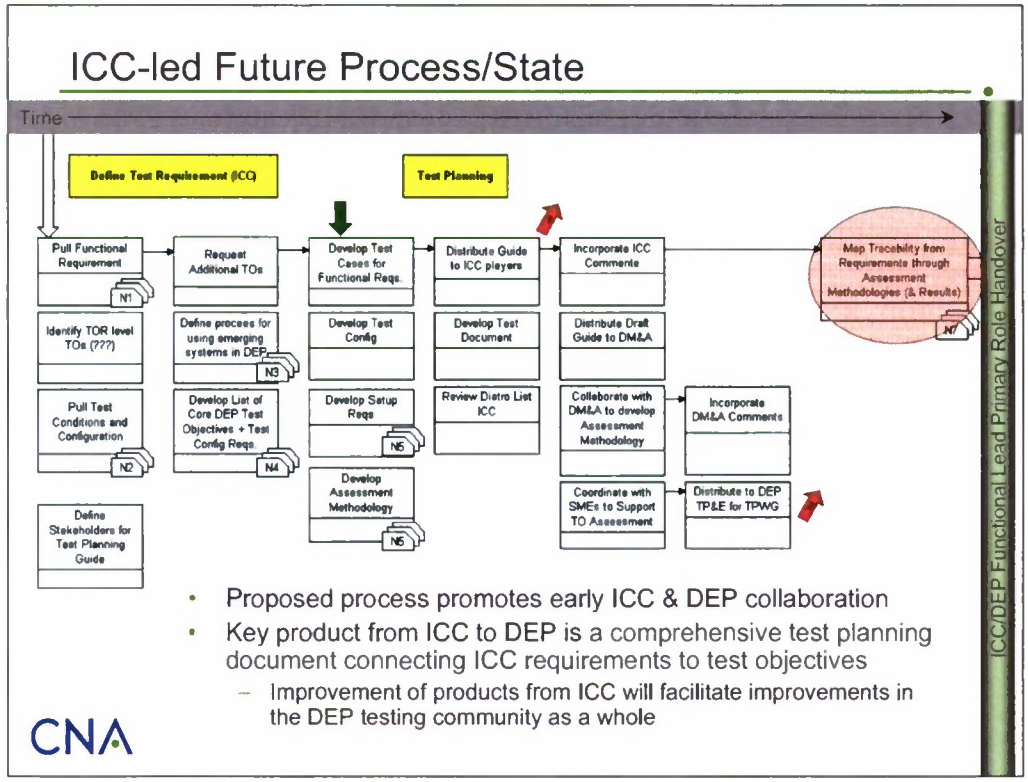
The Future State diagram incorporates a significant increase in up-front participation by the DEP functional leads. The ICC test planning time has been extended to a 17-week workup period that may create extended overlaps between event timelines for a given fiscal year.

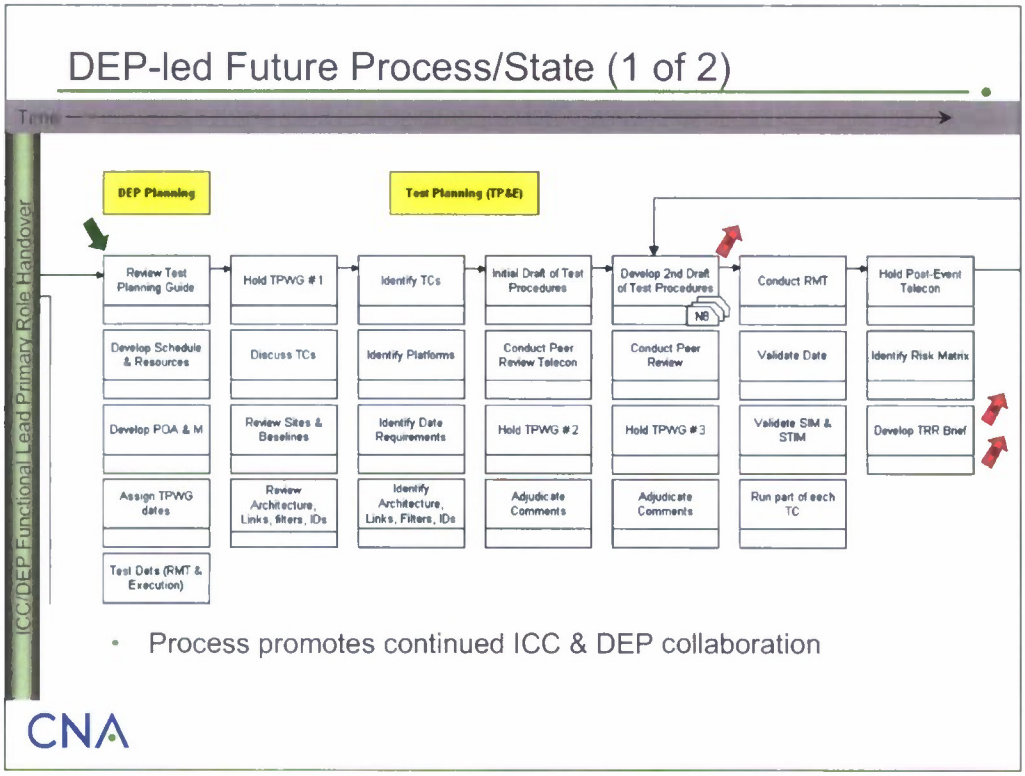
In the Future State, the handover from the ICC to the DEP occurs at the delivery of a formal test planning document that is collaboratively developed between the DEP and the ICC stakeholders. After the handover occurs, the DEP functional leads assume primary role responsibility and are responsible for test execution and the delivery of the analysis results to the ICC.



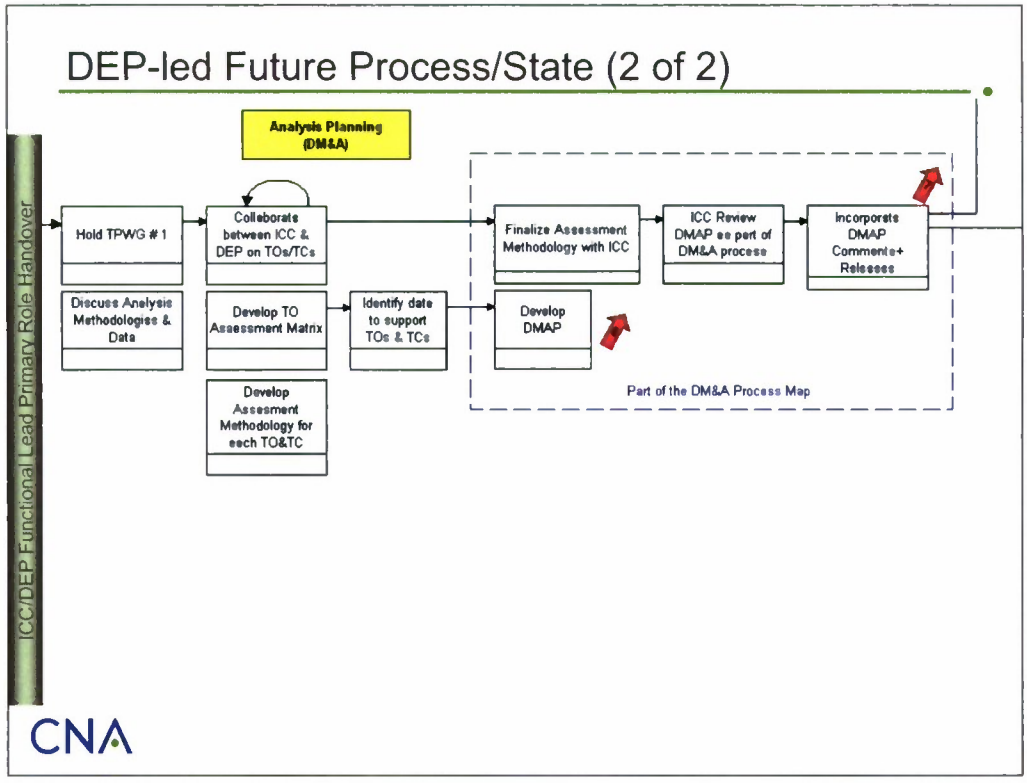
Each box in the diagram represents a specific process task. For illustration purposes in this document we have divided the Future State process diagram into three sections. The ICC planning phase is outlined in the slide above. On later slides we will show both the DEP TP&E and DM&A phases after the ICC and DEP primary role handoff occurs.

In the ICC planning phase, along with the critical handover to the DEP functional leads, there are two key process steps that set the Future State apart from its predecessor: (1) defining key DEP and ICC stakeholders for the development of a formalized test planning guide and (2) creating traceability between requirements and test objectives. The key stakeholders are defined earlier in the process flow, and this will bring the DEP functional leads into the test process much earlier than in the past. The overall testing process will benefit if the DEP functional leads have a better understanding of the ICC's motivations and initial test requests, while the ICC will be more familiar with the DEP capabilities to test and analyze requirements that are to be tested in the DEP. This is especially important for new combat systems and their related subsystems that have never been tested within the DEP.

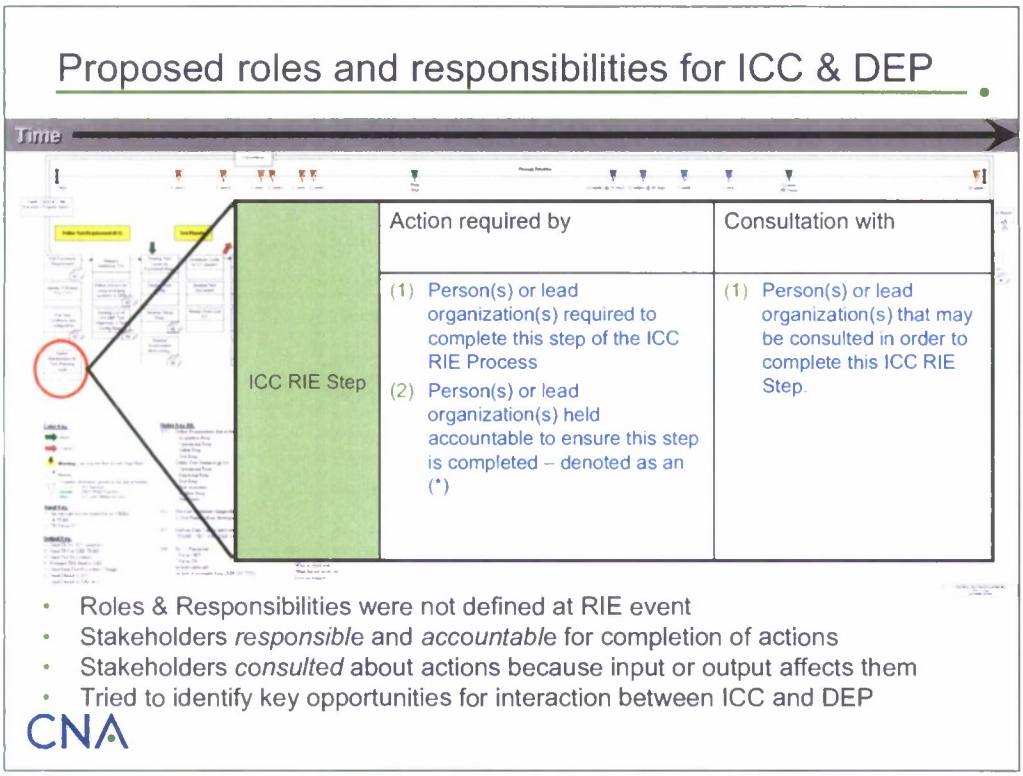
The final step before the primary role handover from ICC to DEP is the delivery of a formal test planning document that clearly maps the ICC requirements to the test objectives and the planned analysis.



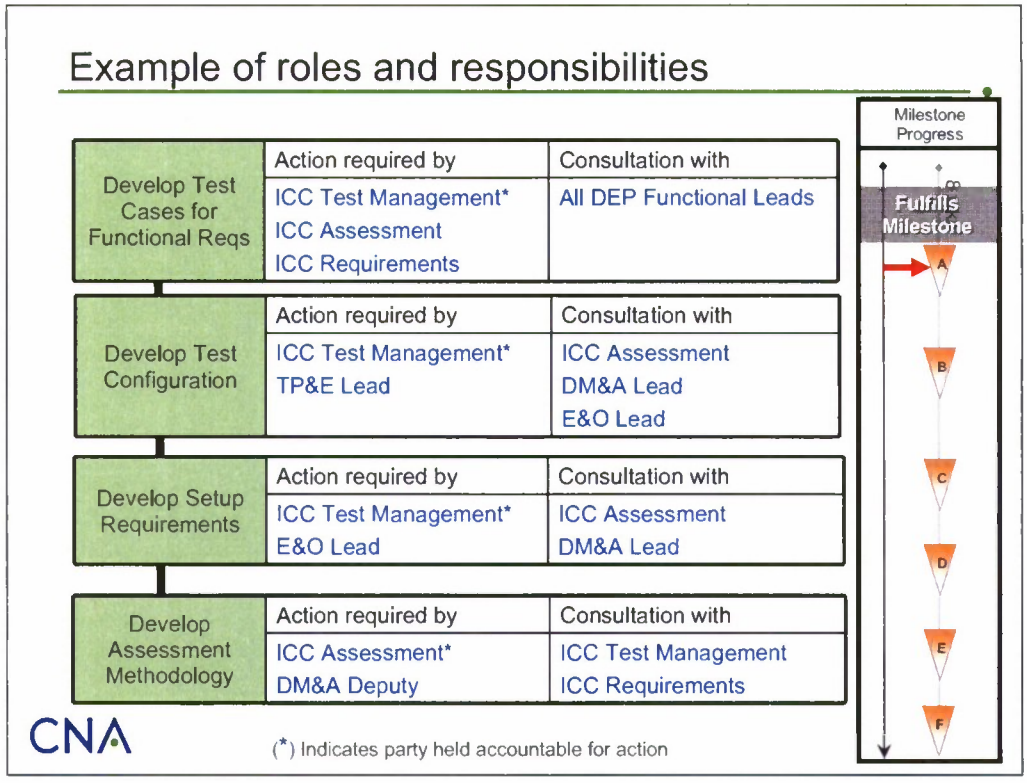
After the ICC handover of the formal test planning document, all test planning, execution, data management, and analysis responsibilities are passed to the DEP functional areas. The DEP planning portion of the Future State diagram has been split into two pieces: the TP&E tasks (above) and the DM&A tasks (next slide). The tasks in the slide above, driven primarily by TP&E, progress in parallel to the DM&A tasks on the next slide. For example, related steps are shown on both process diagrams such as "Hold TPWG #1". E&O, while always maintaining the overall readiness of the DEP, also participate in several of the specific steps outlined on these two slides. As with the proposed ICC planning phase, now the DEP functional areas must maintain collaboration with the ICC.



Here we present the DM&A Future State process steps that lead to test execution. These steps occur in parallel to the steps on the previous page. Many of these steps highlight areas where contact with the ICC or other DEP functional areas would be necessary. We did not consider in this BUR the steps labeled "Part of the DM&A Process Map" above. The DEP addressed these steps in more detail in a separate process improvement event, and they are beyond the scope of the BUR. Test execution and analysis follow the steps seen above and were not considered in detail during the RIE, although we introduce ideas for revising data analysis later in this report.

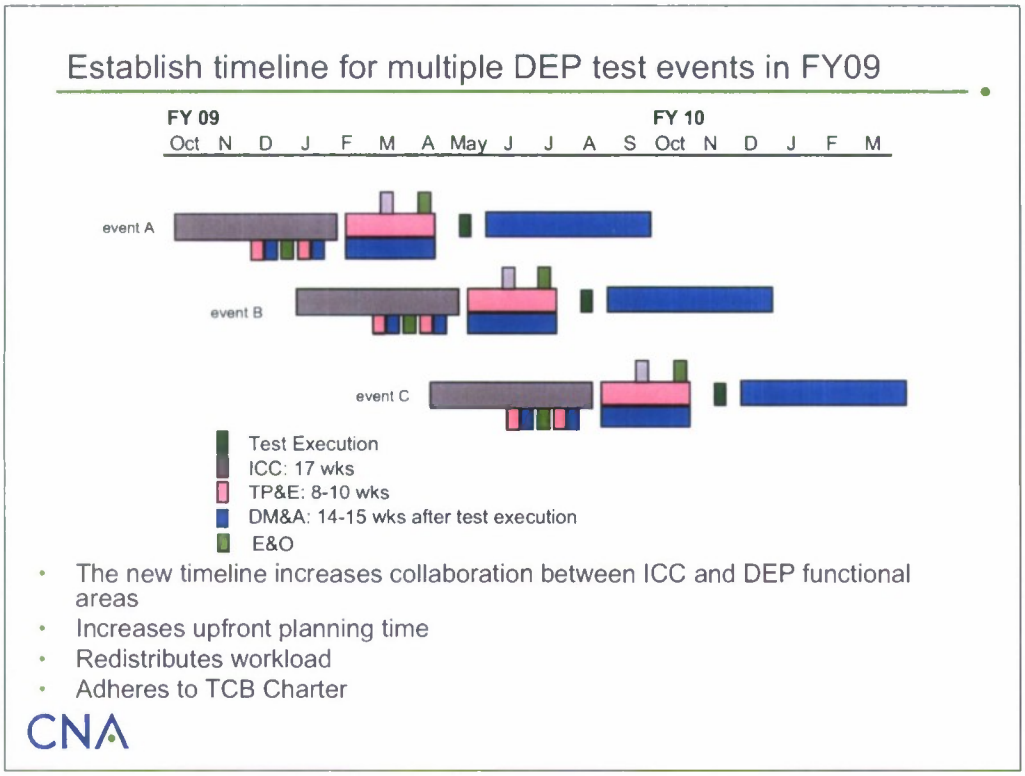


The ICC and DEP functional leads, in collaboration with CNA, have established roles and responsibilities for the entire Future State testing process. We solicited comments from all DEP functional leads and all members of the ICC on our preliminary assignment of roles. Our final recommendations for each process step, which can be found in their entirety in Appendices A and B, incorporate these comments. For each process box in the proposed Future State diagram, CNA has recommended the person or organization responsible and accountable for completion of that process step. In addition, we identify who the responsible person(s) or organization(s) should be collaborating with in order to make that process step successful. For illustration purposes, we provide a sample column of process steps in the ICC planning phase on the next page.



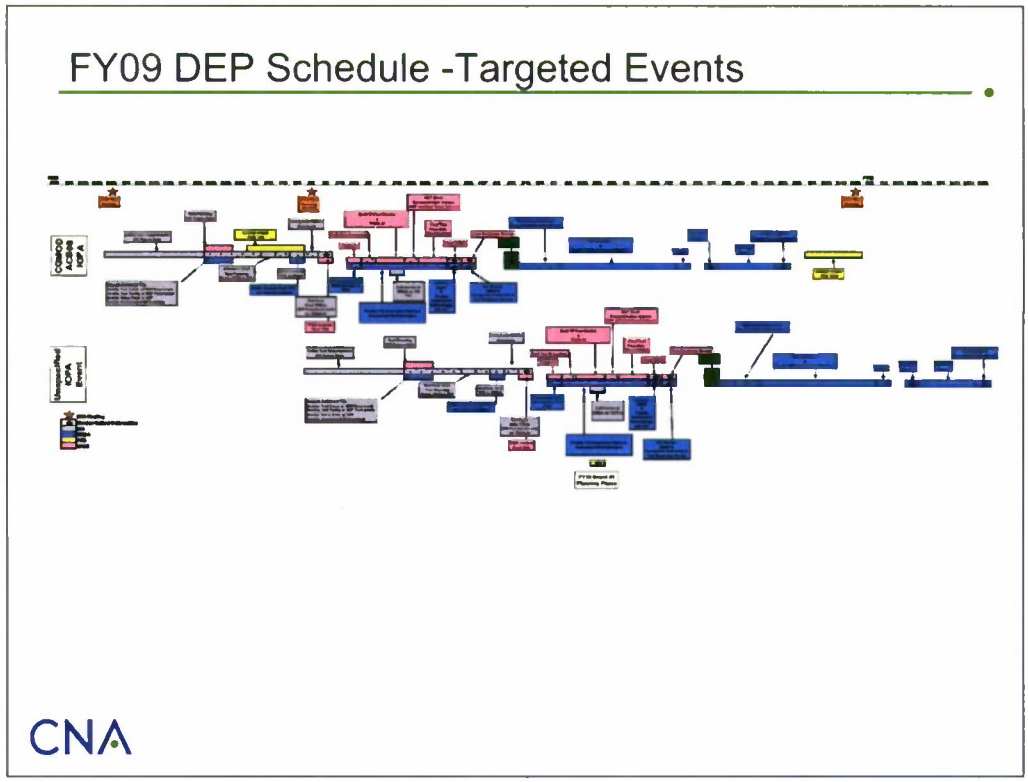
This slide describes a specific example of the format used to establish roles and responsibilities in the ICC-DM&A Future State. We list each step and associated subtasks from the Future State. The specific example above demonstrates the increased interaction during the ICC planning phase of DEP testing. Developing Test Cases, Test Configurations, and Setup Requirements are all responsibilities of the ICC, but also each one of these process steps requires analysis and input from the appropriate DEP functional area.

On the right-hand side of each slide is a timeline adapted from the Future State process map. We include an arrow on the timeline to show process progress for each column. The steps on a single slide are not meant to be taken as linear in time; they may occur simultaneously. However, the process does flow forward in time from one column to the next in the overall Future State diagram. The full set of roles and responsibilities is included in Appendices A and B to this report.



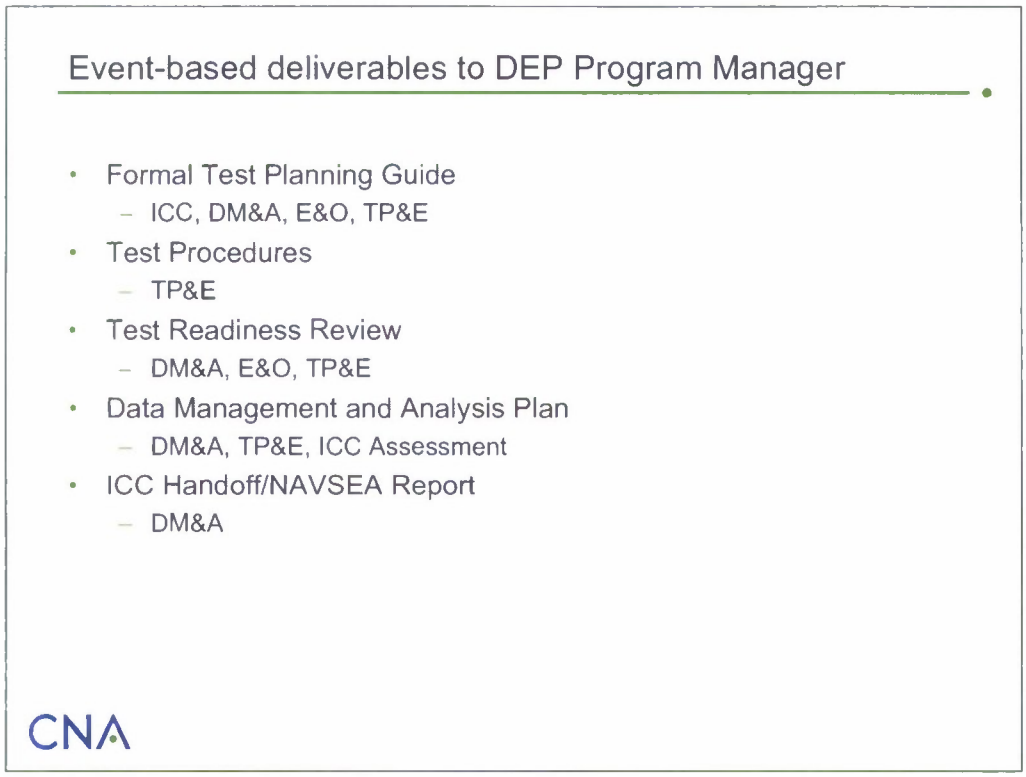
Since the DEP executes multiple test events within a given fiscal year, we wanted to determine the impact on workload when multiple events modeled after the Future State are overlaid for a given fiscal year. In the slide above, we have developed a general future state timeline for multiple events executed within a fiscal year. On this slide, we demonstrate how the new Future State impacts the overall workload for all ICC and DEP functional areas in a fiscal year when multiple events are planned.

As we discussed on prior slides, the Future State process requires a 17-week lead time for planning. The DEP program plans approximately 3 to 4 ICC interoperability tests for a given year. The notional timeline diagram above shows the planning overlap for all participants in a DEP event. For example, during event A, the initial grey box represents the ICC planning phase with collaboration from TP&E (pink) and E&O (green) and DM&A (blue) groups. The ICC continues to collaborate with the DEP functional areas when the lead role switches from the ICC to DEP functional areas in event A (approximately February 2009). Of note is that when the lead role switches for event A, planning for event B has already begun. This succession of planning efforts will persist through the evolution of the fiscal year while the staff across the DEP and ICC remains constant. This redistribution and stacking of workload requires refocused planning across the ICC and DEP in order for event planning progress to move in a forward direction.



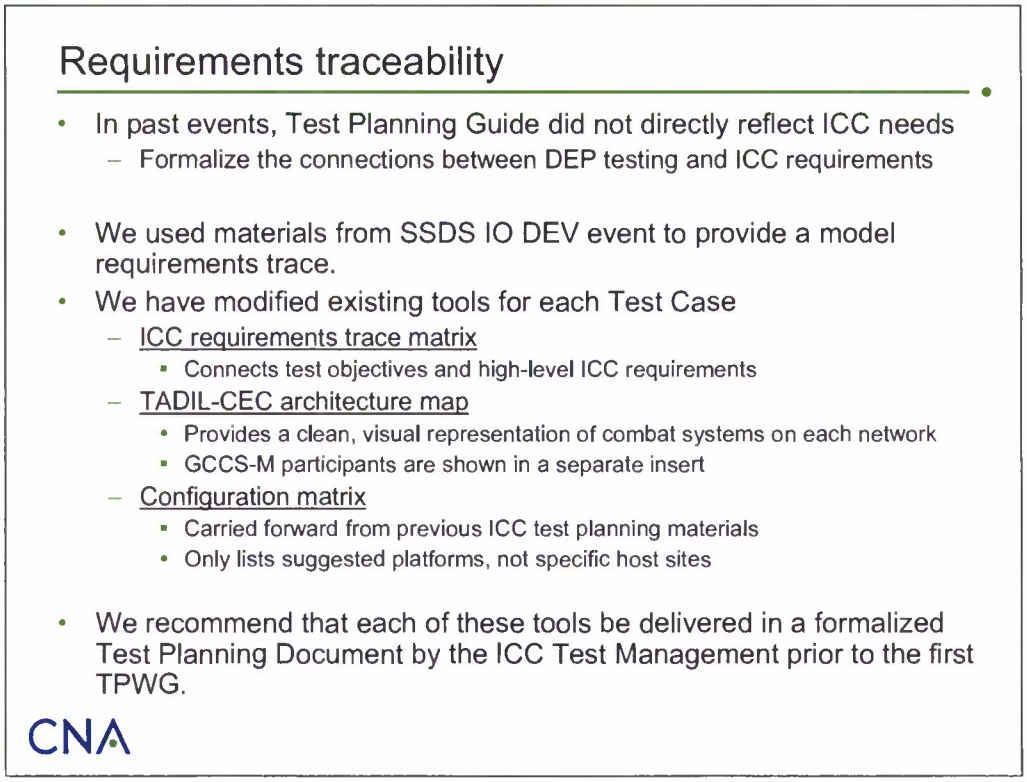
For the upcoming DEP events in the 2009 fiscal year, CNA has targeted the Cruiser Modernization (CGM) Interoperability Assessment (IOPA) Test as a dry run of the Future State. The CGM IOPA is planned for execution in May 2009. On this slide, we have assembled a detailed timeline on a week-by-week basis that includes process steps, responsible functional areas, and deliverables for the CGM IOPA overlaid with the last IOPA event of the FY that is currently planned but unspecified. The timeline is included full-size in Appendix F. Because the Future State was heavily influenced by ICC test planning, we then added established timelines from current Plan of Action and Milestones (POA&M) published in test procedures and Data Management and Analysis Plans (DMAP) that largely remain unchanged from the former IOPA test process. This combined timeline incorporates the lessons learned from the RIE event and also is an accurate representation of the analytical effort that is necessary after test execution.

The reality of the increased ICC planning phase and the early collaboration of the DEP functional areas is that planning for the first event at the beginning of a fiscal year must occur five to six months prior to the start of the fiscal year. This planning requirement presents various funding and manning challenges for the DEP PM.



The previous sections of this document focused on the roles that the ICC and DEP functional areas perform and the specific details of the testing process. In the remainder of this document, we focus on multiple products, such as the ICC Test Planning Guide and imbedded traceability matrix, that should pass among the interoperability assessment test stakeholders as they share information. We believe that a formal ICC Test Planning Guide should be developed collaboratively between the ICC and DEP functional areas. The tools within this guide will convey requirement traceability among stakeholders and between process steps.

Here we summarize the current list of deliverables that correspond to event-based milestones on the previous timeline slide. All deliverables are carried over from the former interoperability assessment process except the formal test planning guide. We also list who should be involved in producing each deliverable. Previously, an informal test planning guide had been produced solely by ICC Test Management and was delivered to the DEP at the start of the Test Plan Working Group (TPWG). One of the key recommendations of the ICC/DM&A RIE is for the ICC Test Management, with the collaboration of all DEP functional areas, to produce a formal test planning guide.



On this slide, we discuss the requirements trace that we developed showing the connection between ICC interoperability requirements and DEP test objectives. This traceability, the core of our original tasking from the DEP Program Manager, is the foundation for improved test execution, data analysis, and interoperability assessment throughout the ICC-DEP testing process.

In order to establish the traceability from the high-level ICC requirements to the interoperability assessment test objectives, we used materials from the Ship Self Defense System (SSDS) Interoperability Development (IO DEV) 08 assessment event to develop a model requirements trace [6, 7]. This event was originally planned to be completed in FY08 but has been postponed. For an IO DEV test, the ICC defines several test cases, each representing a different set of testing conditions. Each test case is divided into more specific test objectives. The ICC's design of test cases and test objectives is driven by high-level warfare requirements. However, the current and informal ICC Test Planning Guide does not directly make the connection between high-level ICC requirements and test objectives. We recommend that the description of each test objective in the test planning material includes the three tools listed in the slide above: a requirements trace that we are establishing, a simplified link architecture map, and a combat system configuration matrix. The simplified link architecture map and combat system configuration matrix are modifications of items currently included in the informal ICC Test Planning Guide. We will describe each of these tools and provide examples of their use. These tools should be part of the test planning

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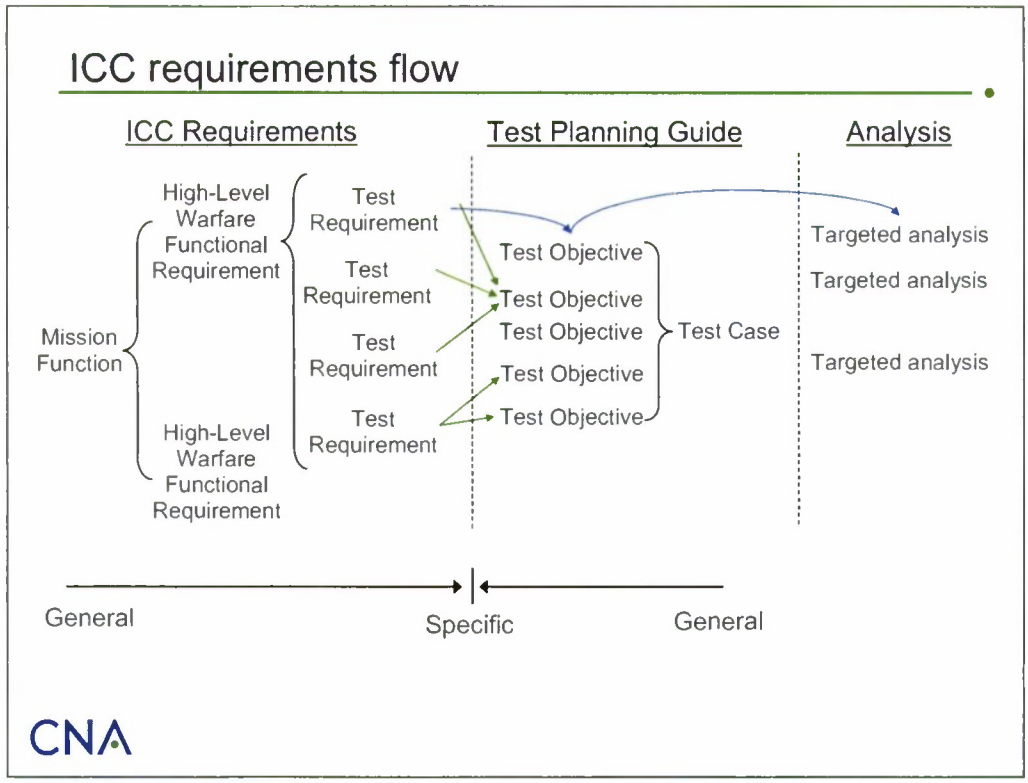
documentation. The collaborative ICC/DEP functional area formal test planning guide will be delivered by the ICC test management lead to the broader DEP community prior to the first Test Planning Working Group (TPWG) as outlined in the above FY09 target events schedule.



The ICC uses a set of high-level requirements to guide the composition and configuration of a strike force participating in an interoperability assessment test. The requirements are derived from various sources, including military standards (e.g., MIL-STD 6016C [8]), Navy doctrine, and Joint publications. We do not discuss the original sources of requirements here because they are beyond the current scope of the BUR.

These requirements start with very general descriptions of Mission Functions. Each Mission Function is composed of several more specific Warfare Function Requirements. A list of the requirements relevant to the DEP appears in Appendix D. Very recently, the ICC has further divided each Warfare Functional Requirement into several detailed Test Requirements. As an example, one Mission Function is Surveillance Track Reporting, which is divided into six High-Level Warfare Functional requirements, each focusing on a different capability.

In the current testing process, the ICC test management includes their required test cases and associated test objectives within their informal test planning guide. Nominally, this includes required combat systems and the desired tactical configurations for each test case. Each test case contains several test objectives. In the past, there has been no clear connection between the requirements and the objectives. This disconnect has resulted in incomplete test execution and incomplete analysis results. Therefore, the requirements traceability must pass not only into the test objectives but also into all future analysis methodologies.

How we created the traceability matrix

(1) Determine which ICC requirements are DEP Specific – already completed by the ICC Requirements Lead

DEP SPECIFIC ICC Master Requirments		
Function	**Subfunction**	**Functional Requirement**
Mutual Tracking MT-DEP	**SIAP**	**MT11** - Evaluate capability of platform when operating with the Strike Force to maintain a single track per object (SIAP Clarity).
		MT12 - Evaluate capability of platform when operating with the Strike Force to maintain a continuous LTN and CEPN (SIAP Continuity).
		MT13 - Evaluate capability of platform when operating with the Strike Force to maintain a common picture such that the tracks held by each participant have the same LTN, LTN/CEPN pairing, ID, position, on the same object (SIAP Commonality).

(2) Map each test case and test objective directly (D) or indirectly (I) to functional requirements

Test Case	**Objectives**	Mutual tracking		
		SIAP		
		MT11	**MT12**	**MT13**
Test Case 1: Test Strike Group	Compare SIAP results to RSG.	D	D	D
	Verify the SSDS is able to operate with High TN IU units and other interoperability fixes based on SSDS and CDLMS VDDs or fix lists.	D	D	D
	Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks	I	I	I

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

We accomplished the requirements trace in two steps. First, we took the master list of ICC requirements and determined which requirements could be tested within the DEP environment, already denoted by the ICC requirements lead as being suitable. The first table above shows a subset of the DEP-relevant, high-level ICC requirements, which can be found in their entirety in Appendix D. Second, based on material from the SSDS IO DEV event [6], we thoroughly examined each test case and corresponding test objectives and assigned appropriate ICC Functional Requirements. The requirements may map either directly or indirectly. If a requirement maps "directly" to a test objective, it indicates that data measured in a DEP test apply directly to the requirement to assess whether the requirement has been satisfied. An "indirect" map implies that DEP data can support an ICC requirement, but do not specifically satisfy the objective; additional data from other tests may be required. The resulting matrix highlights the rationale for each objective tested, based on official ICC requirements. We expand the above matrix on the next page to provide a more detailed example.

ICC requirements trace matrix

Currently delivered by ICC to DEP in Test Planning Guide — Proposed trace component

Test Case	Objectives	Mutual Tracking						
			Correlation		TN MGMT	SIAP		
		MT5	MT6	MT7	MT10	MT11	MT12	MT13
Test Case 1: Test Strike Group	1. Compare SIAP results to RSG.					D	D	D
	2. Verify the SSDS is able to operate with High TN IU units and other interoperability fixes based on SSDS andCDLMS VDDs or fix lists.	D	D	D	D	D	D	D
	3. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and Link networks					I	I	I

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources, may be used to address whether a requirement has been met

- Implied connections to ICC requirements become defined

CNA

Currently, the ICC delivers its test cases and test objectives to the DEP in a table similar to the first two columns above (taken from the SSDS IO DEV 08 test [6]). However, there is no visible connection to the underlying ICC requirements that drive these test cases and objectives.

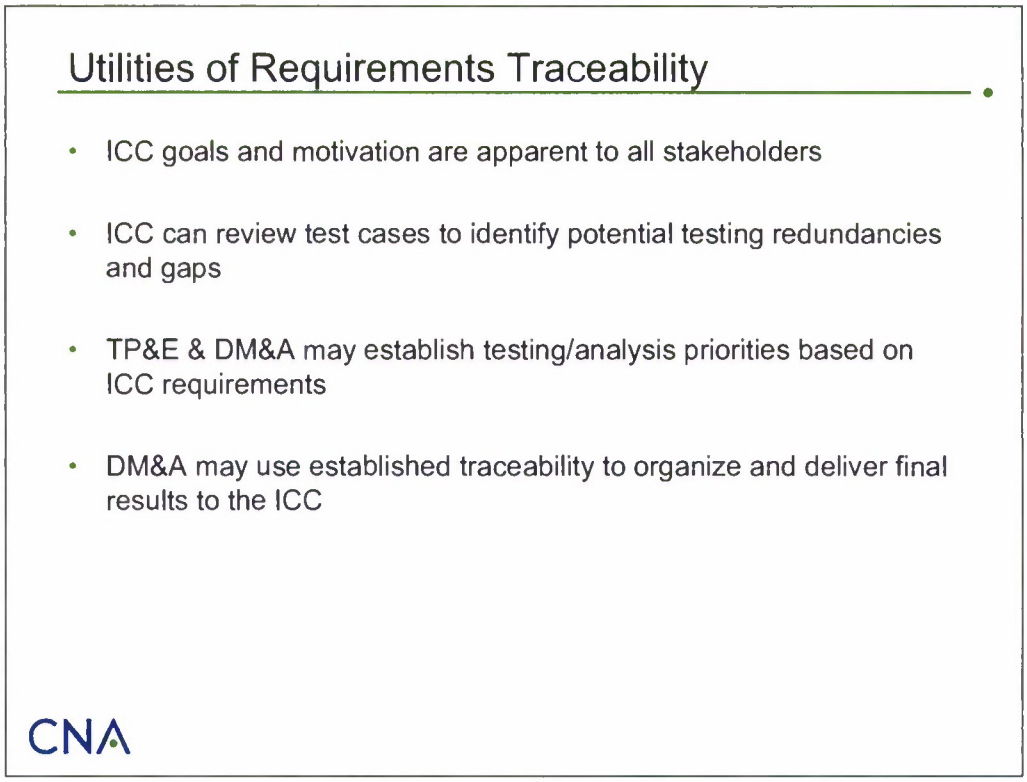
We propose adding a set of columns to the test case/test objective table (as shown above on the right-hand side of the table) that clearly demonstrates how each requirement maps to a specific test objective. The new columns will contain all of the ICC Functions, Subfunctions, and Functional Requirements maximizing the amount of information communicated from the ICC to all DEP functional areas about the motivation behind each test case and composite test objective.

In each column, the ICC can indicate which test objectives are based on each requirement. Again, objectives may map directly or indirectly to each requirement. The table above is a portion of the complete requirements trace. Here we take Test Case 1, the Test Strike Group, and show a sample of three of its test objectives. The columns to the right contain the ICC requirements. In this example, we show Mutual Tracking as one of the ICC Mission Functions. Correlation, Track Number (TN) Management, and Single Integrated Air Picture (SIAP) are subfunctions of the Mission Function. Each subfunction is further divided into specific High-Level Warfare Functional Requirements, abbreviated here as MT5, MT6, etc. From this trace matrix, we see that Test Objective 1 of Test Case 1 is designed to directly addresses the SIAP requirements.

(continued)

Test Objective 2 is based on all of the Mutual Tracking requirements, and DEP testing can directly satisfy each of those requirements for this objective. In addition, SIAP Mutual Tracking applies to Test Objective 3, but DEP testing will only indirectly satisfy this Objective. The full trace for Test Case 1 and all other SSDS IO DEV 08 test cases is in Appendix C.

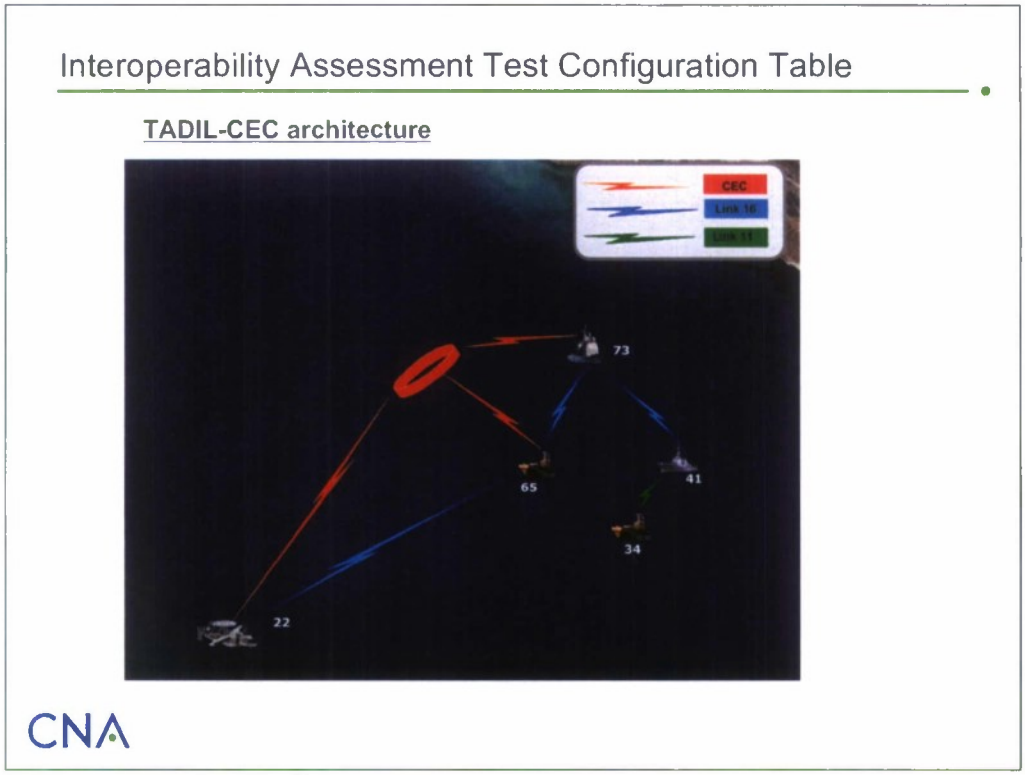
As we discussed earlier, the goal of creating the completed requirements trace was to eliminate the implied connections between requirements and objectives and define these components explicitly to participants including DEP leadership, analysts, test planners, site engineers, and operators. It is also important that while ICC Test Management is responsible for delivering and maintaining this traceability matrix, DEP functional leads and other necessary ICC members should also be consulted as defined in the ICC Future State.



Explicitly mapping the underlying ICC requirements to test objectives provides critical connections between the requirements the ICC is hoping to assess and the planned test objectives. Several functional areas within the ICC and DEP will benefit from this trace.

First, the requirements trace will allow the ICC to determine if current test cases and test objectives over-test or under-test each of the requirements for a given event. For example, the requirements dealing with SIAP attributes appear in multiple test Cases and objectives; it may be possible to restructure, or consolidate these objectives if there are potential redundancies.

Because of the requirements trace, the DEP and ICC functional leads that are responsible for planning and executing the test will have a better understanding of the requirements being tested in each test case. On occasion, due to technical difficulties, a test case cannot be completed as planned. The requirements that drive each test case can help all stakeholders decide which systems can be substituted and which ones are absolutely necessary for test execution based on the requirements that are being addressed. Also, due to time limitations, sometimes it is not possible to complete all test cases that are planned for a given event. When this occurs, the requirements trace can aid the test director and ICC Test Management in prioritization of test cases; the test director can then focus on those test cases that address the most important requirements for assessment.



We believe two additional tools can help support traceability of ICC requirements. These tools should also be part of the formal ICC test planning guide and should be carried forward through succeeding test documentation that results from the planning guide (e.g., Test Procedures, DMAP). The next tool we examined is the network diagram that shows the tactical data information link (TADIL) and Cooperative Engagement Capability (CEC) architecture. In the current test planning documentation, the TADIL-CEC architecture diagram provides a graphical representation of the link connectivity of the participating units in each test case [6]. This diagram is frequently referred to as the OV-1 diagram, for Operational View-1 from Department of Defense Architecture Framework (DODAF) terminology. An OV-1 is a high-level operational concept graphic. One of its intentions is to stress and describe system connectivity. In the OV-1 shown in the slide above, Link-11, Link-16, and CEC connectivity are each drawn in different colors.

The OV-1, while useful, has shortcomings when used as a technical diagram for DEP test planning and execution. In these cases, it can be difficult to follow all of the lines belonging to each network. In the above example, the CEC network is shown as a circle above the participating combat systems. There are three lines connecting three combat systems through the circle. The Link-16 connections, on the other hand, are drawn directly between combat systems. For Link-16, three lines connect four platforms. These inconsistencies may create confusion for an operator at one of the testing sites. In other cases, all of the networks will use the lines connected through a circle above the platforms.

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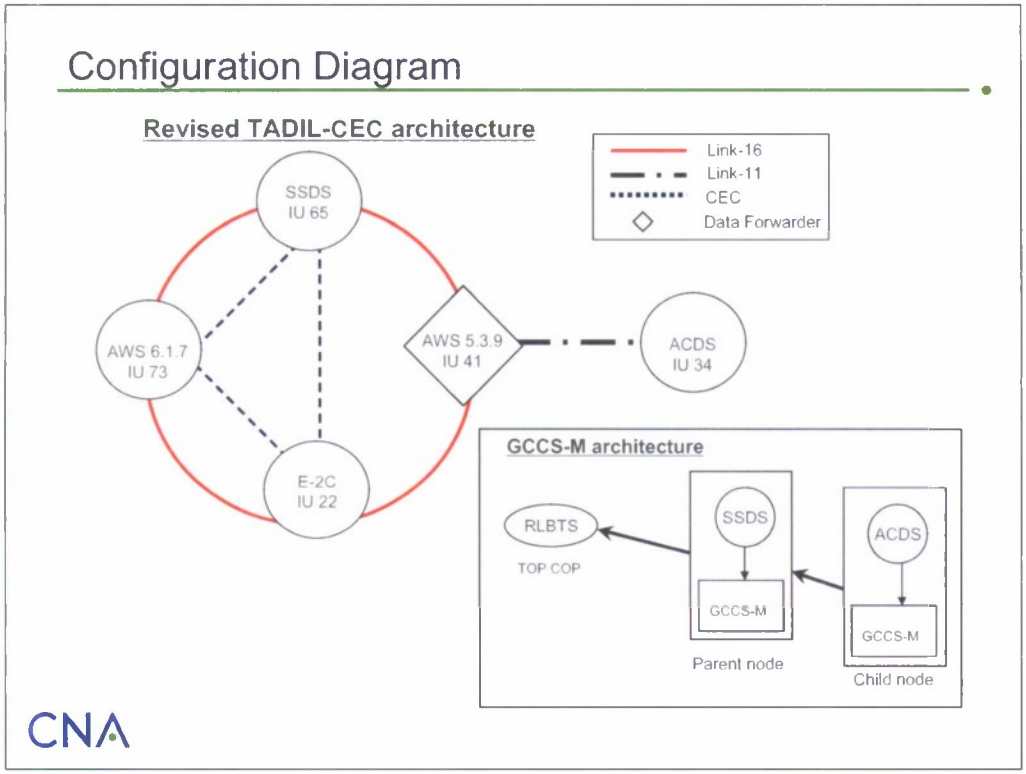
An additional challenge to using the OV-1 diagram as a technical guide for connecting combat systems during a test is that it does not reproduce clearly in black and white. Because of cost and speed, most documents are printed in black and white. When test operators or analysts use this diagram without color, it is difficult to determine the definitive connectivity. This confusion can lead to setup errors in the test.



We have revised the OV-1 diagram in such a way that it is more useful to all functional areas. We suggest using the above format as a more technical description of test cases. The lines representing each tactical network are different colors for when printed in color, but the different line styles reproduce the architecture diagram clearly in black and white. The lines connect directly to the platforms, making it still easier to read. This particular test case called for the inclusion of the Global Command Control System-Maritime (GCCS-M); we include the architecture for this network as an inset. Other features of the diagram include different shapes for the different roles a combat system plays within a strike group. For example, a diamond designates the data forwarder unit between Link-16 and Link-11. In additional test cases in Appendix C, certain combat systems are set to the "data silent" mode. We designate this mode by darkening the circle for the unit. The clarity of this configuration diagram is retained also when the document is printed in black and white.

The clean and simple approach taken here has already proven its effectiveness. When we presented these sample test case diagrams to the ICC based on materials from the SSDS IO DEV 08-01 test, ICC Assessment identified two mistakes in the test configuration that had previously gone undetected. We attribute this to confusion in the setup of the tactical configuration.

We recommend this diagram replace or supplement the current OV-1 diagram within the document. The diagram above is more technical and provides details and clarity that are essential for proper test execution.

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After the test is complete, TP&E should update the diagrams with any configuration changes that occurred during execution. Due to unavoidable circumstances, sometimes the test setup is changed or modified. When this happens, it is important to make the changes clear to all participants. An update of the above diagram and corresponding configuration table should be produced. The Test Director's post-event execution summary report would be an appropriate document to host these changes to be distributed to all DEP and ICC stakeholders.

Configuration Matrix

Configuration Matrix

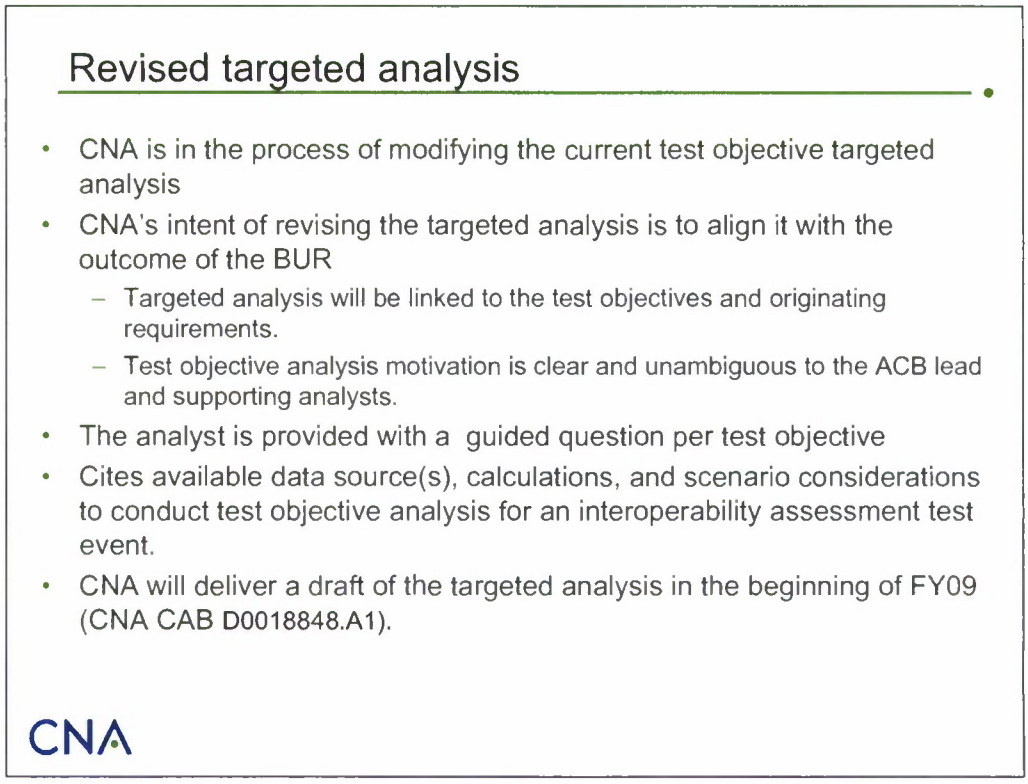
- Carried forward from previous ICC test planning materials
- Only lists suggested platforms, not specific host sites at this phase of planning

Test case 1		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	E	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable

CNA

The final tool we discuss as a part of the test planning guide is the test configuration matrix. We included the configuration matrix that is carried forward from the current test documentation [6]. The main difference is that this table does not include specific software builds. Rather, it lists the general class of combat system to be used. The ICC and DEP functional leads would determine specific software at a later time (at the Test Planning Work Group) based on both testing needs and site availability. This matrix contains necessary site setup information about platforms; dialed track quality (DTQ); link status for Link-11, Link-16, Satellite, CEC, data forwarding, Link-11 track number associations, and transmitting pending filters; and correlation based on gridlock reference unit and battle force correlation coordination. The architecture map on the previous slides should be easily produced from this table.



After we established the traceability between the ICC requirements and the interoperability assessment test objectives (TO), we wanted to then show the next step in the progression, revising the targeted analysis so it too is in alignment with the outcome of the BUR. CNA is developing a draft version of revised targeted analysis for the upcoming SSDS Interoperability Assessment test executed in September 2008. We will work with DM&A to ensure the targeted analysis is comprehensive and realistic for the current suite of TOs and is adaptable to future interoperability assessment tests.

The main goal of revising the targeted analysis is to create a critical link between the analysis and the originating ICC requirements for each TO. This linkage provides the Analysis Control Board (ACB) lead and supporting analysts with a clear motivation for each TO that will aid them in formulating the most complete and proper piece of analysis. Additionally, we provide the analyst with guided questions per TO that engages the analyst, leading them to consider the scope and necessary steps of the TO assessment [9].

Our proposed revision of the targeted analysis includes the layout of the critical tool sets an analyst will need for TO assessment, including required data sources, calculations, and specifics about how to best utilize the available scenario to discover interoperability issues. These details are a starting point for the analyst, not necessarily the entire scope of the potential analysis. The analysts will still need

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to isolate problems and determine the root cause of each issue through fault-isolation analysis as in past interoperability assessment test analysis.

The revised targeted analysis will be delivered as a separate document shortly after the start of FY09, but we discuss the concept here because it is an integral product based on the outcome of the BUR [9].

Revised analytical brief to ICC

- Maps results to high-level ICC Requirements (denoted as "ICC Function" in table)
- Provides a starting point and prioritization for the ICC to perform assessments

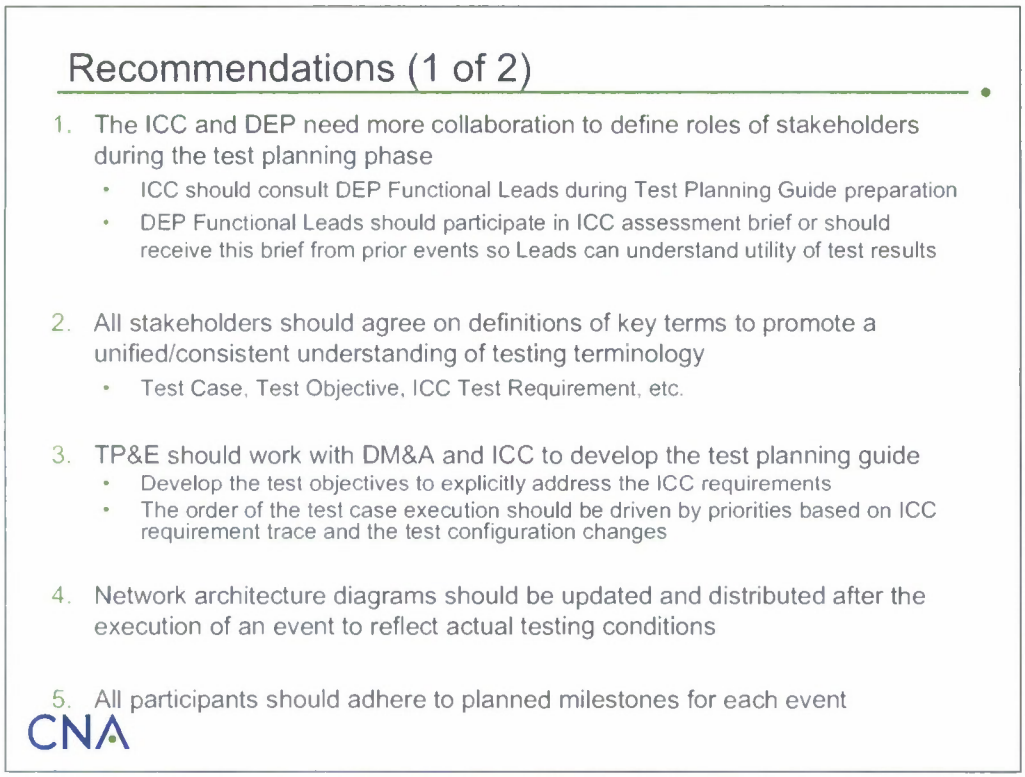
TOR	Element	Issue Title	Status	Severity	ICC function
Outstanding TR					
7212-D71-005	C2P	C2P does not correctly translate weapon type to Link 11	TR	4B	FC/Engagement
7212-D71-007	ACDS	ACDS does not clear engagement on TN after break engage from remote IU	TR	4B	Surveillance
7212-D71-011	SSDS	Platform experienced CEC interface LTN issue	TR	4B	Surveillance
7212-D71-802	AWS 5.3.9	AWS 5.3.9 fails to clear mutual bit when assuming R2	TR	2C	Mutual tracking
7212-D71-803	AWS 6.1.7	AWS 6.1.7 transmits surveillance message on active non C2 JU after correlation	TR	4B	Surveillance
7212-D71-806	E-17A	AWACS pairs same L11 track number to multiple L16 track number	TR, Documented as CAP/LIM	4B	Surveillance
7213-D71-005	CDLMS	CDLMS transmits terminate control message with reference TN=0000	TR	2C	AC
7213-D71-009	AWS 6.1.7	AWS 6.1.7 reports TN under control by wrong CU	TR	2C	AC
7213-D71-802	E-2C	E-2C Downgraded Symbology to Local Track	TR	4A	Mutual tracking
7213-D71-803	SGS/AC	Incorrect SGS/AC buffers cause incorrect ID changes on Link 16	TR	2B	ID

CNA

Previously, we revised the CVN 68 Open Architecture IO DEV test brief [5]. The main goals of the revised brief were to streamline the results and present them at a high-level understandable to program management, rather than to subject matter experts who conducted the analysis. Also, this brief needed to communicate to the ICC how the issues uncovered during testing mapped back to the functional requirements. This revised brief product was not part of the original scope of the BUR. However, we make mention of this revised brief because it demonstrates how issues found during analysis must be referenced to feed the ICC assessment process.

On this slide, we show a list of high priority/severity issues from the CVN 68 IO DEV test and their corresponding functional requirement [5]. Each line of the table describes a different problem found by the analysis team. The TOR number is the Test Observation Report number for the observed issue. The element is the combat system or subsystem responsible for the issue. The status column indicates whether the issue is formally accepted as a Trouble Report (TR) by the combat system developer. The severity column assigns a frequency (A-E, A the highest) and severity (1-5, 1 the highest) to the issue. The final column, ICC Function, indicates which high-level ICC Mission Function (the highest level requirement) pertains to each issue.

Ultimately, the connection of analysis results to ICC requirements will help the ICC establish a starting point for their assessment. DEP has agreed to deliver an assessment of ICC requirements based on the table above.



After participating in several process improvement events, discussing results with ICC and DEP stakeholders, and completing the BUR, we have compiled a list of recommendations for the ICC and DEP to help incorporate the above results.

(1) The ICC and DEP need more collaboration to define roles of stakeholders during the formal test planning phase. The ICC must consult with DEP Functional Leads while preparing the formal Test Planning Guide to determine the availability and feasibility of testing and analysis needs for a given event. To that end, the DEP Functional Leads should participate in the final ICC assessment brief to the fleet after each interoperability assessment event (or at minimum receive a copy of this brief) so they can better plan for upcoming events based on the current needs of the ICC. In this capacity, DEP will be able to provide better support to the ICC.

(2) The ICC and DEP functional leads must come to a consensus and finalize the definition of key terms (i.e., Test Case, Test Requirement, Functional Requirement, etc.) to promote a unified, consistent understanding of key interoperability assessment testing terminology. At present, based on conversations with personnel in both ICC and DEP, we believe there may be subtle inconsistencies and differences in interpretations of these terms that create confusion between the organizations. While this may appear to be a matter of semantics, in fact, it was one of the major hurdles we faced when conducting the BUR.

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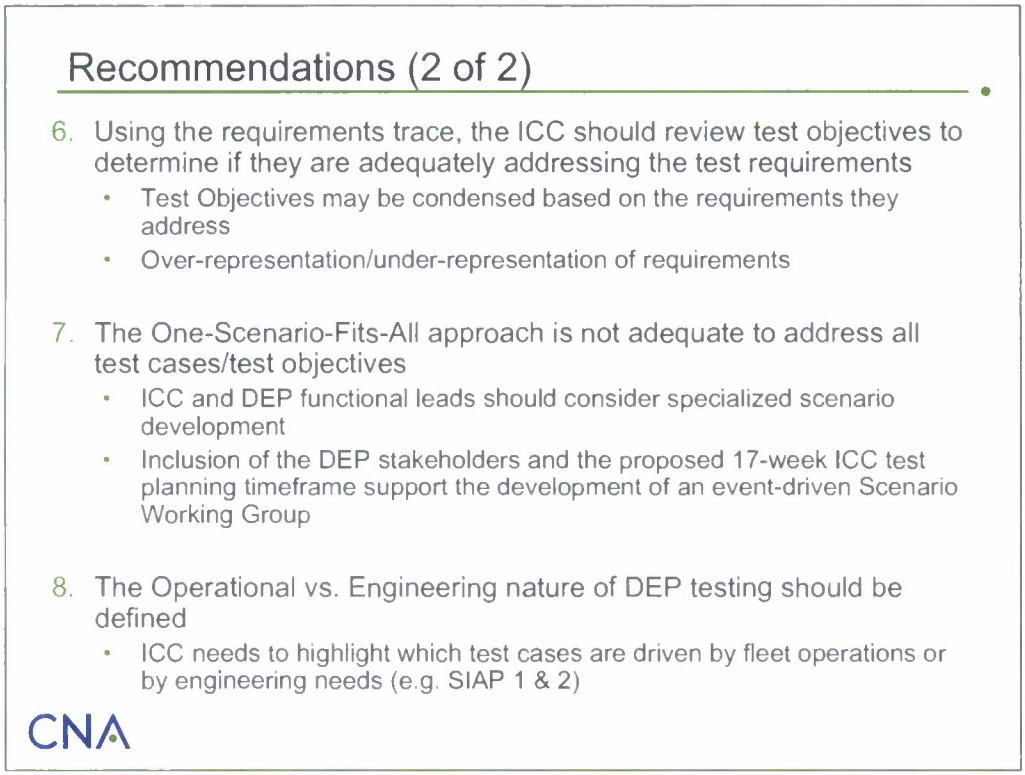
(3) TP&E, DM&A, and ICC must work together to develop the formal test planning guide. Currently, some of the test objective statements in the informal ICC test planning guide, such as "compare SIAP results of TSG to RSG", are vague and do not clearly connect with ICC requirements. Therefore, these test objectives need to be written in a way to indicate their connections to the ICC requirements. Once the motivation and intention of test objectives are clear, DEP and ICC can establish testing and analysis priorities.

In addition, the order of the test case execution should be driven by two factors: the priorities based on the ICC requirement trace and the minimization of test configuration changes.

(4) If modifications to planned testing conditions are made during test execution, TP&E must update the network architecture diagrams and configuration tables after event execution.

(5) All stakeholders must adhere to planned milestones for each testing event. Collaboration has been designed into the Future State, and it is important for personnel to participate at all points where they have a role or responsibility. Because of the early collaboration among the stakeholders in the RIE Future State, a majority of test planning labor can be accomplished during the initial ICC planning phase that may alleviate time constraints prior to test execution. Additional evolution of the ICC-DEP assessment testing process may need to occur after the Future State process has been executed, but the success of the RIE events and BUR will rest on personnel adapting to the new timelines.



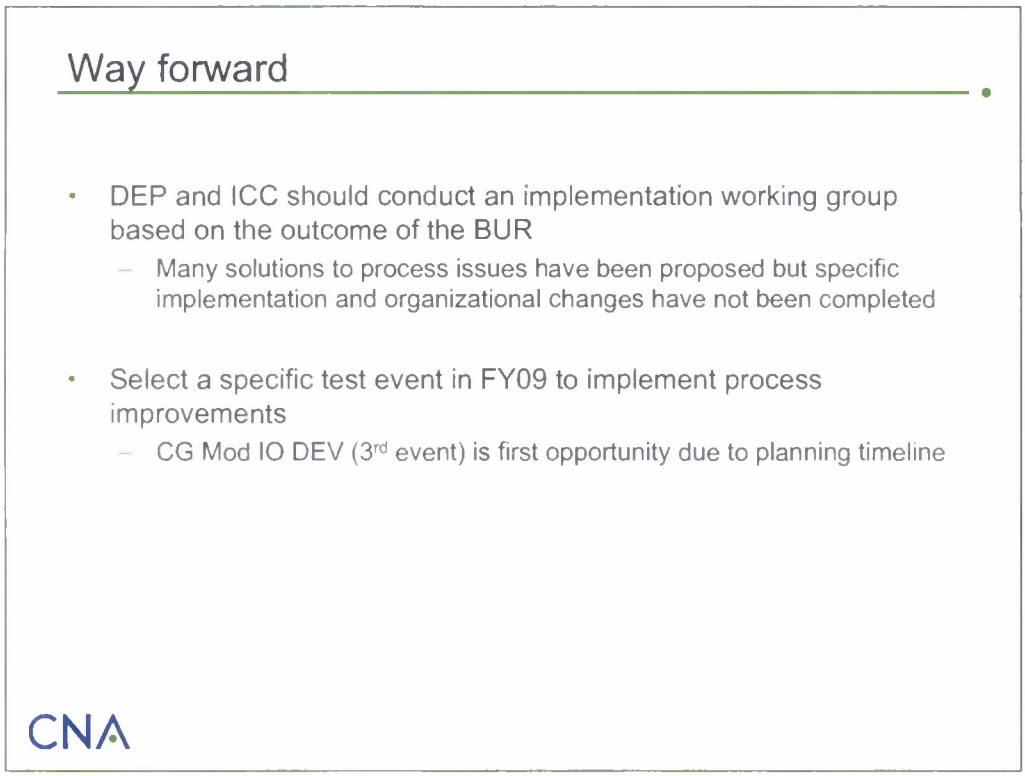
(6) Using the requirements trace, the ICC must review test objectives on an event by event basis. The requirements trace matrix highlighted that the efficiency of testing may not be maximized. There is overrepresentation of some requirements and underrepresentation of others. Several test objectives map directly to the same set of requirements, and it may be possible for the ICC to consolidate these. Other test objectives can be reconsidered because they only indirectly address ICC requirements.

(7) When comparing the ICC requirements to both the current and proposed analysis methodology, we determined that the One-Scenario-Fits-All approach is not adequate to address all test objectives. The ICC and DEP Functional Leads should consider more specialized scenario development, perhaps per Test Case if necessary. The proposed 17-week ICC test planning period and early inclusion of the DEP stakeholders in planning support the development of an event-driven Scenario Working Group that reviews planned test cases and the required scenario. Alternately, adding a few specialized tracks to the current Air Defense Exercise (ADEX) scenario to suit specific test cases could increase the analytical utility of this commonly used scenario.

(8) The ICC needs to highlight which test cases are operationally- or engineering-driven. For example, we believe the majority of the test cases are intended to replicate operational situations faced by the Fleet. However, the ICC often requests test cases that are meant to root cause specific issues between

(continued)

combat systems that have been observed over multiple interoperability assessment test events. These test cases are more engineering in nature and are not necessarily tied to specific Fleet Platform Certification Decisions (PCD). ICC Test Management and ICC Assessment must communicate the engineering and/or operational nature during the creation of the formal test planning guide.



This annotated brief fulfills the requirements of the BUR as outlined in the FY08 Strategic Plan and serves as the delivered report. We believe the ICC and DEP stakeholders can easily use the products contained within this report and incorporate them into a collaborative and formalized Test Planning Document. The ICC has accepted both the proposed requirements trace and the roles and responsibilities. DEP functional leads also contributed comments and have agreed to the process.

Based on the outcome of the BUR, the DEP and ICC should conduct an implementation working group. Many solutions to process issues have been proposed, but specific implementation and organizational changes have not been completed. Without a final face-to-face working group to decide how to best implement all of the process changes developed during the past year, it is highly probable that the organizational problems that necessitated the BUR will persist. After the implementation working group, the ICC and DEP program management should target a test event to begin implementing the process changes discussed in the BUR. Based on the new extended planning timeline, we have already passed the time when planning would need to begin for the first two proposed test events in FY09. Therefore, we recommend that the third event in FY09 (the CG Mod IO DEV test) will be the first opportunity to fully implement the BUR.

After the completion of several interoperability assessment tests, DEP and ICC should revisit the process changes introduced by the BUR to determine the effectiveness of the proposals. For example, the full 17-week ICC planning period

(continued)

may not be necessary for every event in a calendar year. Process improvement and development should be an ongoing, continuous effort.

References

[1] Single Integrated Air Picture System Engineering Task Force, *Technical Report 2003-029: Single Integrated Air Picture (SIAP) Attributes Version 2.0*, Unclassified, Aug 2003

[2] Naval Sea Systems Command, *Interoperability Certification Committee (ICC): Charter, Roles and Responsibilities*, Unclassified, Jan 2008

[3] Mike George, Dave Rowlands, Bill Kastle. *What is Lean Six Sigma?*, New York: McGraw-Hill, 2004

[4] Navy Distributed Engineering Plant, *SEA 05W Strike Force Interoperability Test Control Board (SFI TCB) Charter*, Unclassified, Nov 2007 (NAVSEA 05)

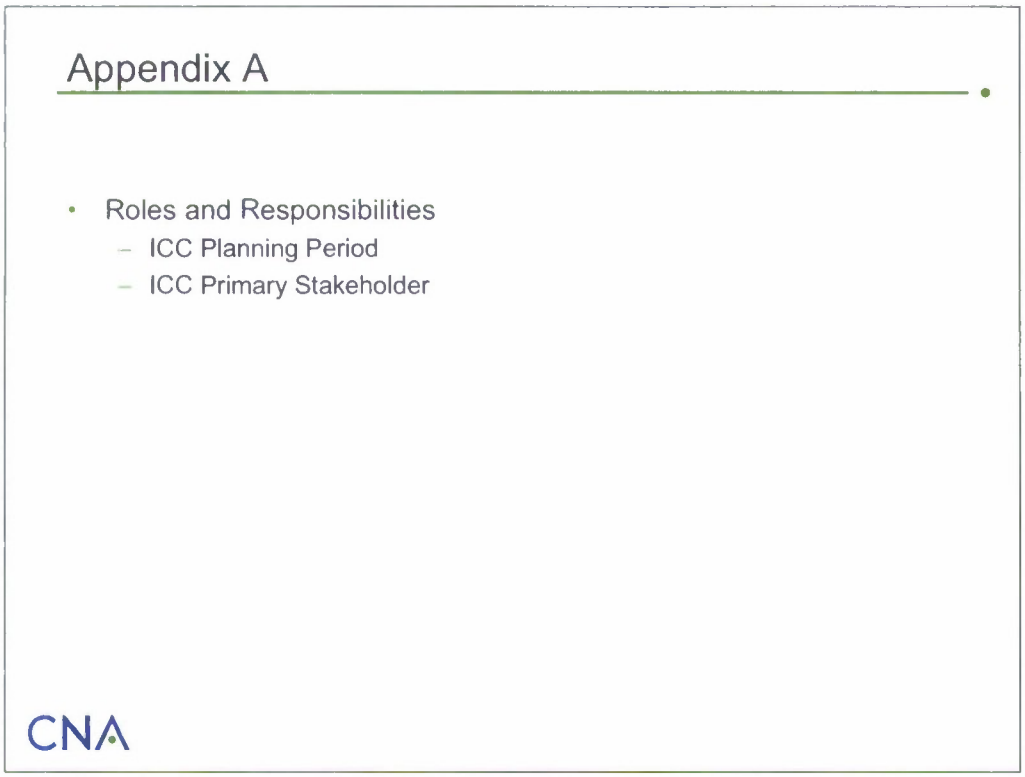
[5] Michael Flory, Jason Jiang, William McNavage, *CVN-68 Open Architecture Interoperability Development Test,* Unclassified, Jul 2008 (CAB D0018373.A2rev)

[6] Navy Distributed Engineering Plant, *SHIPS SELF DEFENSE SYSTEM (SSDS) Interoperability Development (IO DEV) Test*, Unclassified, Apr 2008 (NAVSEA 05)

[7] Navy Distributed Engineering Plant, *Surface Ship Defense System Interoperability Certification Test: Data Management and Analysis Plan*, Unclassified, Apr 2008 (NAVSEA 05)

[8] *Department of Defense Interface Standard: Tactical Data Link (TDL) 16 Message Standard*, MIL-STD 6016C, Unclassified, Mar 2004

[9] Ninghao Jiang, Michael Flory, L. Matthew Foster, William McNavage, *Revised Targeted Analysis for Distributed Engineering Plant (DEP) Interoperability Testing: A supplement for the FY08 Bottom Up Review (BUR)*, Unclassified, Oct 2008 (CAB D0018848.A1)



This appendix contains the recommended roles and responsibilities for the ICC planning portion of the future process state. Each step contains a list of stakeholders who are responsible for completing an action. One of those stakeholders is designated as accountable for making sure the action is complete. We also suggest personnel who should be consulted. This list contains stakeholders who will be affected by the outcome of the step.

Both this appendix and Appendix B are adaptations of the RACI charts that are developed in Lean Six Sigma process improvement events. RACI stands for Responsible, Accountable, Consulted, and Informed. Typically, participants should complete these charts for a newly designed process before concluding the event. However, time did not allow for the completion of these charts at the ICC-DM&A Rapid Improvement Event. Therefore, we suggest the roles and responsibilities here.

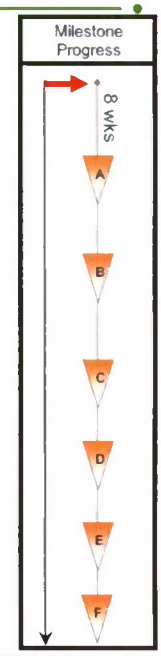
Define Test Requirement (ICC)

	Action Required By	Consultation with
Pull Functional Requirements	ICC Test Management*	ICC Requirements DEP Program Management

	Action required by	Consultation with
Identify Test Objectives	ICC Test Management* ICC Requirements ICC Assessment	DEP Functional Leads

	Action required by	Consultation with
Pull Test Conditions and Configurations	ICC Requirements ICC Test Management* ICC Assessment	DEP Functional Leads

	Action required by	Consultation with
Define Stakeholders for Test Planning Guide	ICC Test Management DEP Program Management*	DEP Functional Leads ICC Requirements ICC Assessment



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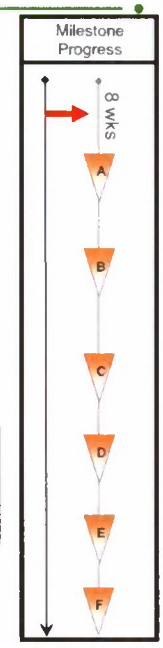
(*) Indicates party held accountable for action

Define Test Requirement (ICC)

	Action required by	Consultation with
Request Additional Test Objectives	ICC Test Management* Test Control Board	DEP Program Management All DEP Functional Leads

	Action required by	Consultation with
Define Process for Using Emerging Systems in the DEP	ICC Test Management* ICC Assessment SSA/SME	All DEP Functional Leads

	Action required by	Consultation with
Develop List of Core DEP Test Objectives + Configuration Requirements	ICC Test Management* ICC Requirements ICC Assessment	All DEP Functional Leads ICC Safety E&O Lead



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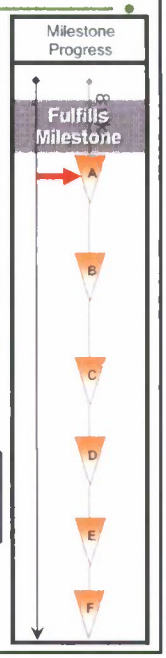
(*) Indicates party held accountable for action

Test Planning

	Action required by	Consultation with
Develop Test Cases for Functional Reqs	ICC Test Management* ICC Assessment ICC Requirements	All DEP Functional Leads
Develop Test Configuration	ICC Test Management* TP&E Lead	ICC Assessment DM&A Lead E&O Lead
Develop Setup Requirements	ICC Test Management* TP&E Lead E&O Lead	ICC Assessment DM&A Lead
Develop Assessment Methodology	ICC Assessment* DM&A Deputy	ICC Test Management ICC Requirements



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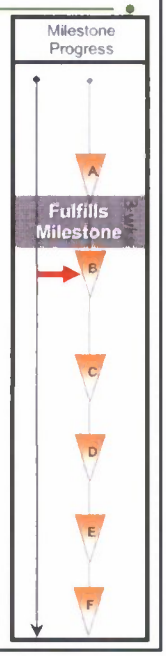
(*) Indicates party held accountable for action

Test Planning

	Action required by	Consultation with
Distribute Guide to ICC Players	ICC Test Management*	ICC Stakeholders
Develop Test Document	ICC Test Management* ICC Assessment ICC Requirements	DEP Functional Leads
Review ICC Distribution List	ICC Test Management*	ICC Stakeholders



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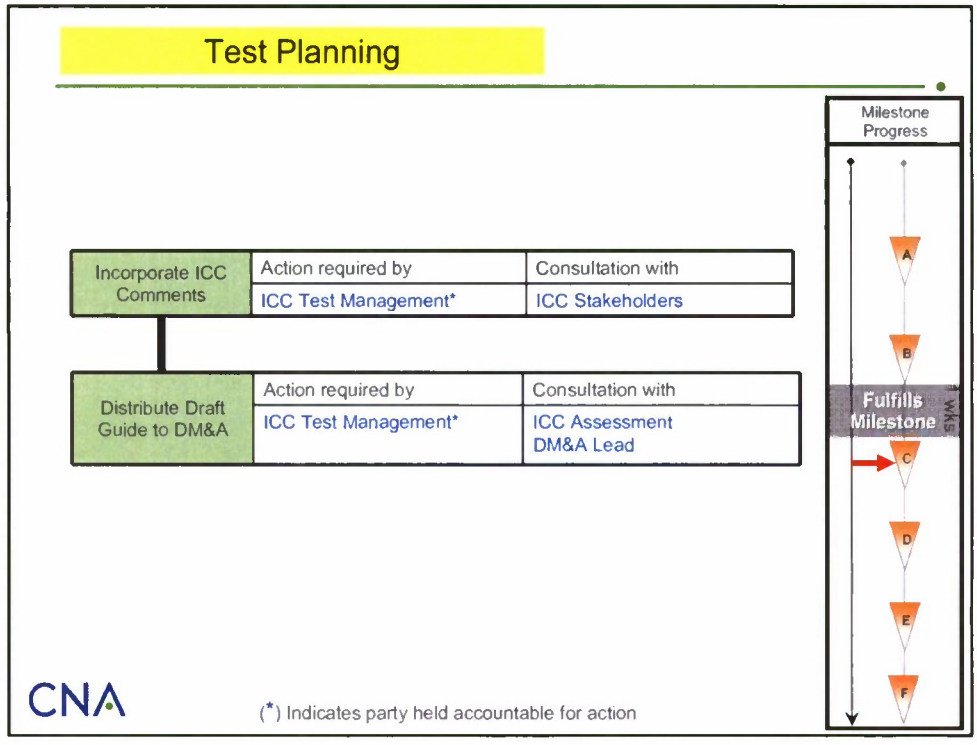
(*) Indicates party held accountable for action


Test Planning
Incorporate ICC Comments
Action required by
ICC Test Management*
Consultation with
ICC Stakeholders
Distribute Draft Guide to DM&A
Action required by
ICC Test Management*
Consultation with
ICC Assessment
DM&A Lead
Milestone Progress
A
B
Fulfills Milestone
1 wks
C
D
E
F
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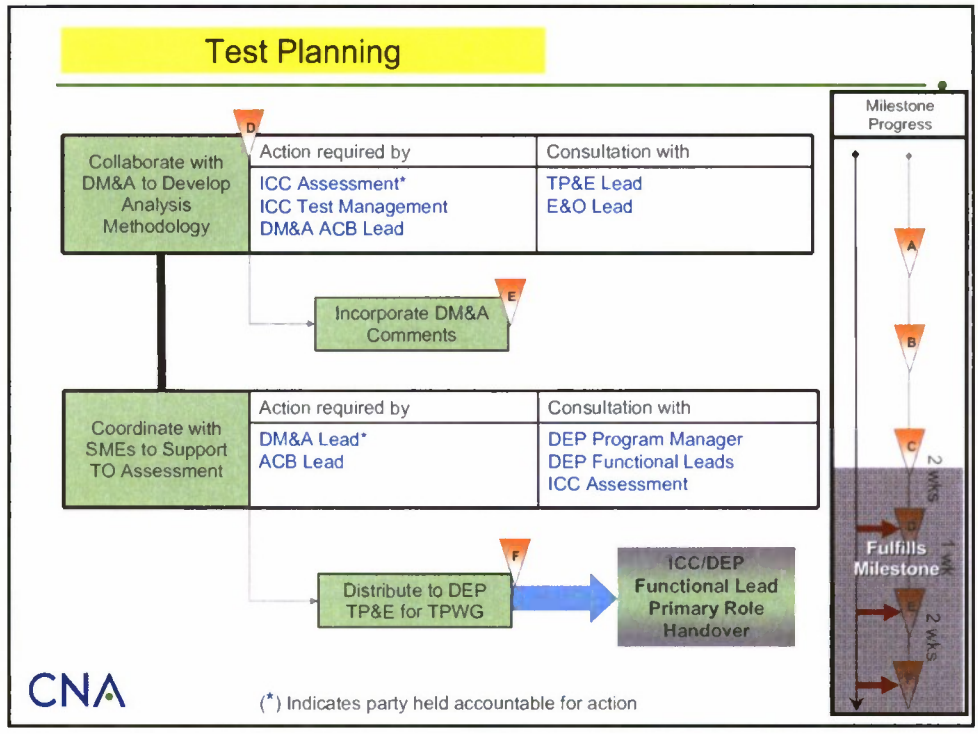
(*) Indicates party held accountable for action


Test Planning
D
Collaborate with DM&A to Develop Analysis Methodology
Action required by
ICC Assessment*
ICC Test Management
DM&A ACB Lead
Consultation with
TP&E Lead
E&O Lead
E
Incorporate DM&A Comments
Coordinate with SMEs to Support TO Assessment
Action required by
DM&A Lead*
ACB Lead
Consultation with
DEP Program Manager
DEP Functional Leads
ICC Assessment
F
Distribute to DEP TP&E for TPWG
ICC/DEP Functional Lead Primary Role Handover
Milestone Progress
A
B
C
2 wks
D
Fulfills Milestone
1 wk
E
2 wks
F
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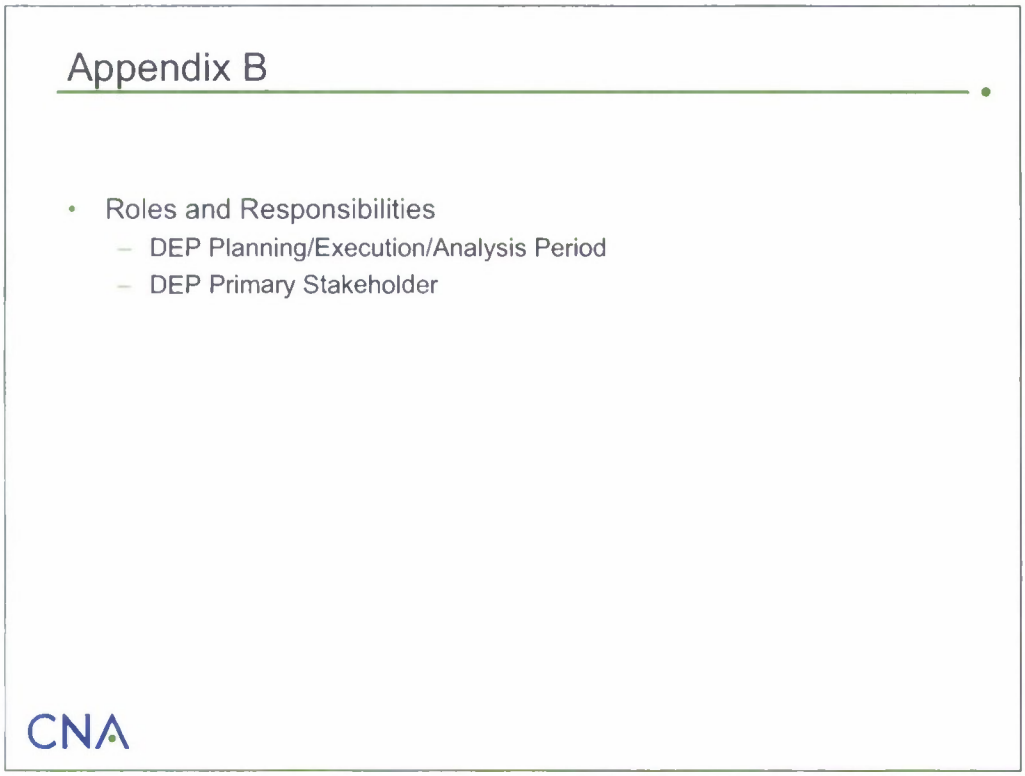
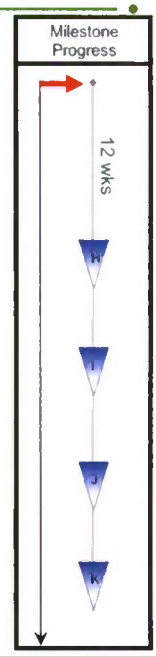
(*) Indicates party held accountable for action



This appendix focuses on roles and responsibilities during the portion of the Future State when DEP is a primary stakeholder.

DEP Planning

	Action Required By	Consultation with
Review Test Planning Guide	All DEP Functional Leads (*)	ICC Test Management ICC Assessment
Develop Schedule & Resources	All DEP Functional Leads (*)	DEP PM
Develop POA&M	All DEP Functional Leads (*)	DEP PM ICC Assessment
Assign TPWG Dates	TP&E Lead (*)	DM&A Lead E&O Lead
Test Data (RMT & Execution)	TP&E Lead (*) E&O Lead (*)	DEP PM DM&A Lead ICC Assessment



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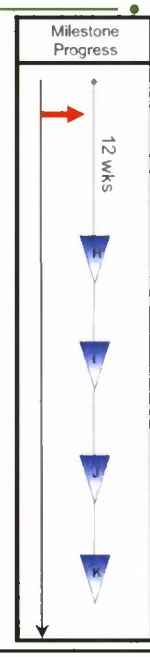
(*) Indicates party held accountable for action

Analysis Planning (DM&A)

	Action required by	Consultation with
Hold TPWG #1	TP&E Lead (*)	All DEP Functional Leads ICC Test Management ICC Assessment
Discuss Analysis Methodologies & Data	DM&A Deputy (*) ACB Lead	ICC Assessment DM&A Data Manager



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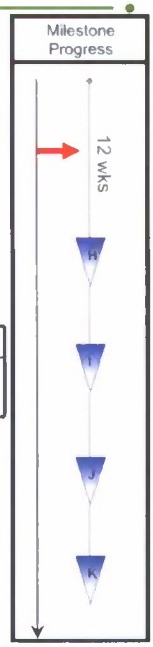
(*) Indicates party held accountable for action

Analysis Planning (DM&A)

	Action required by	Consultation with
Collaborate between ICC/DEP on TO/TCs	ACB Lead (*) ICC Assessment	DM&A Lead
Develop TO Assessment Matrix	ACB Lead (*)	ICC Assessment DM&A Deputy/Lead
Identify Data to Support TOs & TCs	ACB Lead (*) ICC Assessment	DM&A Deputy/Lead
Develop TO/TC Assessment Methodology	ACB Lead ICC Assessment (*)	DM&A Deputy/Lead



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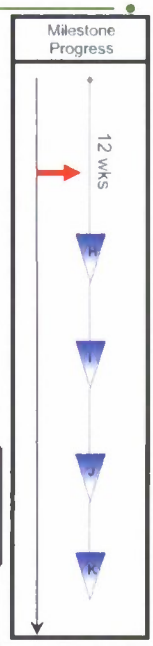
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
Hold TPWG #1	TP&E Lead (*)	All DEP Functional Leads ICC Test Management
Discuss TCs	ICC Test Management	All DEP Functional Leads
Review Sites and Baselines	TP&E Lead (*) E&O Lead (*)	ICC Test Management DM&A Deputy/Lead
Review Architecture, Links, Filters, and IDs	All DEP Functional Leads(*) ICC Assessment ICC Test Management	



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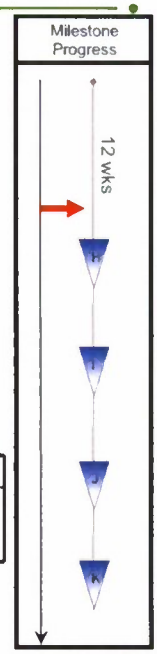
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
"Confirm" Identify TCs	TP&E Lead (*)	Other DEP Functional Areas
"Confirm" Identify Platforms	TP&E Lead (*) E&O Lead	ICC Test Management
"Confirm" Identify Data Requirements	DM&A Lead (*)	E&O Lead (*)
"Confirm" Identify Architecture, Links, Filters, and IDs	All DEP Functional Leads	ICC Test Management ICC Assessment



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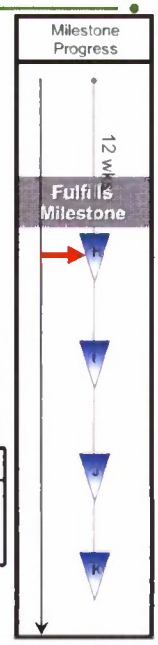
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
Develop Draft of Test Procedures	Test Director (*)	ICC Test Management TP&E Lead
Conduct Peer Review Telecon	Test Director (*)	All DEP Function Leads ICC Assessment ICC Test Management
Hold TPWG #2	Test Director (*)	All DEP Functional Leads ICC Assessment ICC Test Management
Adjudicate Comments	Test Director (*)	ICC Test Management ICC Assessment All DEP Functional Leads



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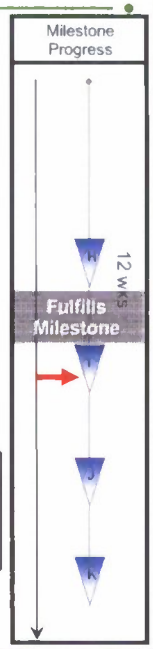
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
Develop 2nd Draft of Test Procedures	Test Director (*)	ICC Test Management TP&E Lead
Conduct Peer Review	Test Director (*)	All DEP Function Leads ICC Assessment ICC Test Management
Hold TPWG #3	Test Director (*)	All DEP Functional Leads ICC Assessment ICC Test Management
Adjudicate Comments	Test Director (*)	ICC Test Management ICC Assessment All DEP Functional Leads



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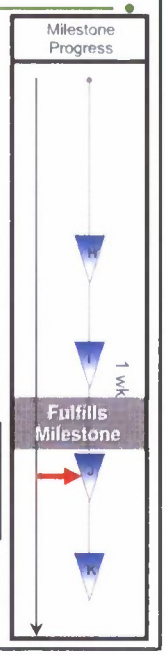
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
Conduct RMT	Test Director (*) E&O DEP Operations Lead(*)	ICC Test Management ACB Lead
Validate Data	ACB Lead (*)	ICC Test Management ICC Assessment E&O DEP Operations Lead
Validate SIM/STIM	E&O DEP Operations Lead(*)	ACB Lead Test Director
Run Part of TCs	Test Director (*) E&O DEP Operations Lead	ICC Test Management ICC Assessment ACB Lead



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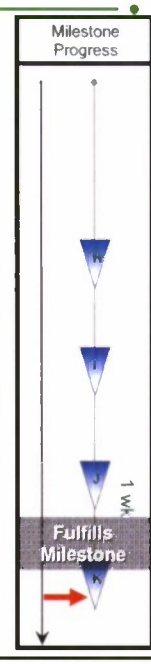
(*) Indicates party held accountable for action

Test Planning (TP&E)

	Action required by	Consultation with
Hold Post-Event Telecon	Test Director (*)	All DEP Functional Leads ICC Assessment ICC Test Management

	Action required by	Consultation with
Identify Risk Matrix	Test Director (*) ACB Lead E&O DEP Operations Lead	All Functional Leads ICC Assessment ICC Test Management ICC Assessment

	Action required by	Consultation with
Develop TRR Brief	All DEP Functional Leads	DEP Program Manager



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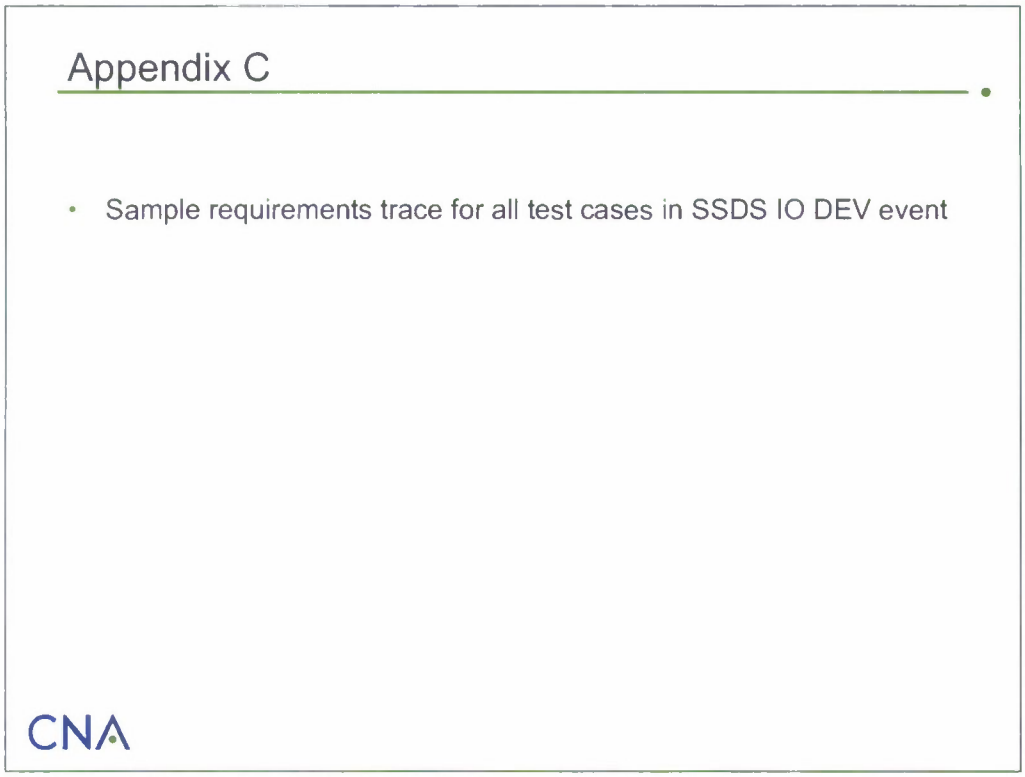

Appendix C contains examples of how to demonstrate traceability of ICC requirements through the Test Objectives. The tools we used are: the TADIL-CEC architecture map, the test configuration matrix, and the ICC requirements trace. We split the requirements trace table over two slides for easier viewing. We have used the SSDS IO DEV 08 event as the basis for these examples and provide here all nine Test Cases. We did not attempt to trace ICC requirements to Test Objectives that refer to GCCS-M because currently there are no ICC requirements for GCCS-M.

Test Case 1

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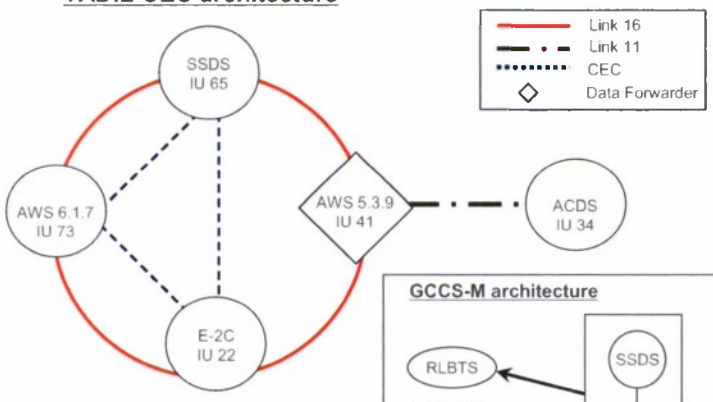
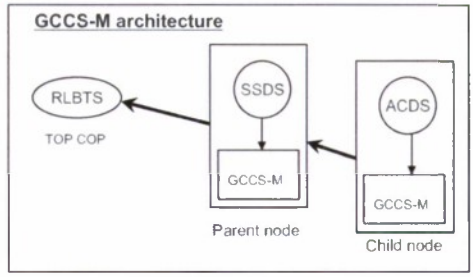
Test Case 1. Test Strike Group 1

TADIL-CEC architecture



GCCS-M architecture



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Test Case 1. Test Strike Group 1

Configuration Matrix

Test case 1		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	E	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable

CNA

Test case 1. Test Strike Group (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific ICC Master List Requirements																					
		Mutual Tracking							Surveillance Track Reporting						Identification								
		Correlation		TN MGMT		SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MGMT	Track Attribute Association		ID			CDO			SIAP		
		MT3	MT5	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14		ID3	ID4	ID5	ID7	ID8		ID12	ID13	
Test Case 1: Test Strike Group	1. Compare SIAP results to RSG.							D		–		–	–								D	D	
	2. Verify the ability of SSDS to operate within the representative SG.																						
	3. Verify the SSDS is able to operate with High Tk IU units and other interoperability fixes based on SSDS and CDLMS VDDs or fix lists.	D	D	D	D	D	D	D	D	D	D	D	D		D	D	D	D		D	D	D	
	4. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CSLT and LINK networks.					I	I	I													I	I	
	5. Verify that the platform under test acting as Parent node is able to disseminate and update all tracks to the TOP COP based on assigned reporting sectors and missions.																						
	6. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse all track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship.																						
	7. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-16 data from ADSI via the MTC interface.																						
	* Overall DEP test objective																						

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 1. Test Strike Group (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Blt IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 1: Test Strike Group	1. Compare SIAP results to RSG.			I			
	*2. Verify the ability of SSDS to operate within the representative SG.						
	3. Verify the SSDS is able to operate with High TN IU units and other interoperability fixes based on SSDS and CDLMS VDDs or fix lists.	D	D	D			
	4. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks				D		
	5. Verify that the platform under test acting as Parent node is able to disseminate and update air tracks to the TOP COP based on assigned reporting sectors and missions.				D		
	6. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse air track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship				D		
	7. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-16 data from ADSI via the MTC interface.				D		
	* Overall DEP test objective						

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

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Test Case 2

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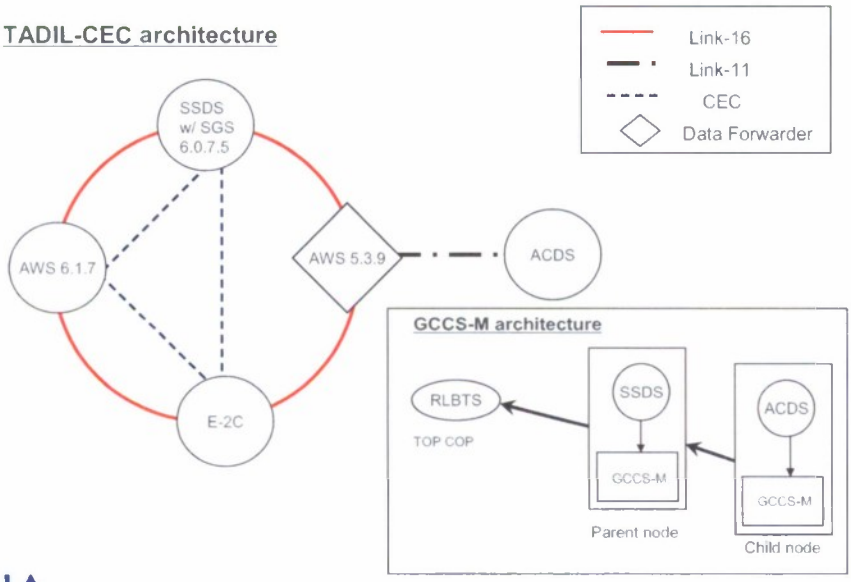
Test case 2. Test Strike Group with SGS 6.0.7.5

TADIL-CEC architecture



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Test case 2. Test Strike Group with SGS 6.0.7.5

Configuration Matrix

Test case 2		Link Status							Correlation	
Platform	DTG	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	E	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable

CNA

Test case 2. Test Strike Group with SGS 6.0.7.5 (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific ICC Master List Requirements																			
		Mutual Tracking							Surveillance Track Reporting					Identification							
		Correlation			TN MGMT	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MGMT	Track Attribute Association	ID			CDO	SIAP			
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID3	ID4	ID8	ID7	ID4	ID12	ID13	
Test Case 2: Test Strike Group with SGS 6.0.7.5	1. Compare SIAP results from the RSG and TSG 1 with TSG 2 assess any differences in performance based on the incorporation of SGS/AC 6.0.7.5 at SSDS. AWS 5.3.9 and AWS 6.1.7 Differences b/w the groups and any anomalies from observation or data will be used to queue detailed analysis.					D	D	D		I		I	I						D	D	
	2. Verify correlation/decorrelation processing and other improvements based on the SGS VDD or applicable fix list.	D	D	D		I	I	I											I	I	
	3. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse eir track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more then one unit is assigned as Link Input Ship.																				

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 2. Test Strike Group with SGS 6.0.7.5 (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordinstion
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordinstion	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 2: Test Strike Group with SGS 6.0.7.5	1. Compare SIAP results from the RSG and TSG 1 with TSG 2 assess any differences in performance based on the incorporation of SGS/AC 6.0.7.5 at SSDS. AWS 5.3.9 and AWS 6.1.7 Differences b/w the groups and any anomalies from observation or data will be used to queue detailed analysis.			I			
	2. Verify correlation/decorrelation processing and other improvements based on the SGS VDD or applicable fix list.						
	3. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse eir track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more then one unit is assigned as Link Input Ship.				D		

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

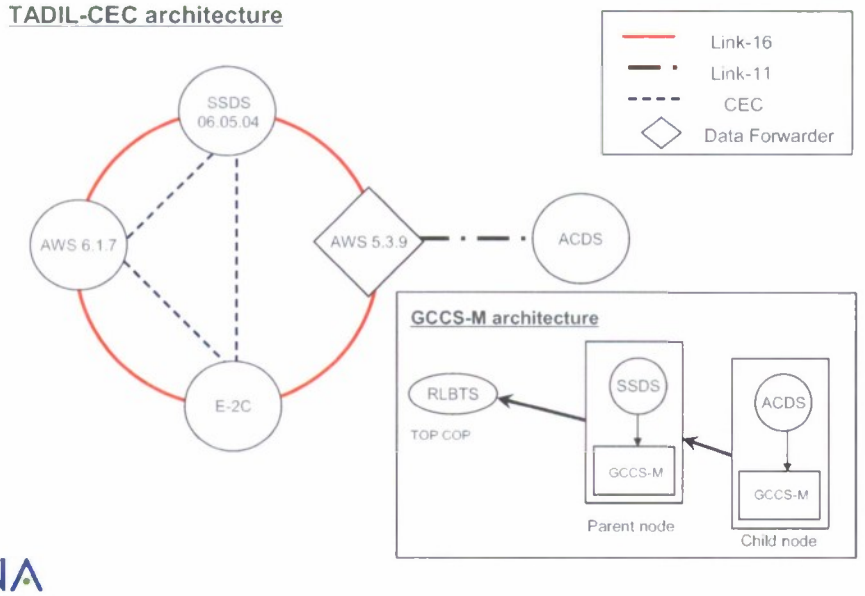
Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test Case 3

CNA

Test case 3. Reference Strike Group



CNA

Test case 3. Reference Strike Group

Configuration Matrix

Test case 3		Link Status							Correlation	
Platform	DTD	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	E	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable

CNA

Test case 3. Reference Strike Group (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																				
		Mutual Tracking						Surveillance Track Reporting					Identification									
		Correlation		TM MDMT	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MDMT	Track Attribute Association	ID			CDO		SIAP			
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID2	ID4	ID5	ID7	ID8	ID12	ID13		
Test Case 3: RSG	1. Compare SIAP results to TSG 1 and 2.					D	D	D		I		I	I						D	D		
	2. Examine the ability of AWS 5.3.9 baseline w/ CDLMS 3.4.4.2-4 to operate w/ the representative Strike Group. AWS 5.3.8 will be operating with a new version of CDLMS that includes corrections to HVLg TN management								D	D		I	I									
	3. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/C3I and LINK networks					I	I	I													I	I
	4. Verify that the platform under test acting as FOTC can properly fuse air track data from participant nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship																					
	5. Determine any differences between GCCS-M COPs when operating in CTP Manager and FOTC modes by comparing TSG 1 and RSG																					

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 3. Reference Strike Group (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 3: RSG	1. Compare SIAP results to TSG 1 and 2.			I			
	2. Examine the ability of AWS 5.3.9 baseline w/ CDLMS 3.4.4.2-4 to operate w/ the representative Strike Group. AWS 5.3.9 will be operating with a new version of CDLMS that includes corrections to Hi/Lo TN management	D	I				
	3. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks				D		
	4. Verify that the platform under test acting as FOTC can properly fuse air track data from participant nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship.				D		
	5. Determine any differences between GCCS-M COPs when operating in CTP Manager and FOTC modes by comparing TSG 1 and RSG.				D		

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

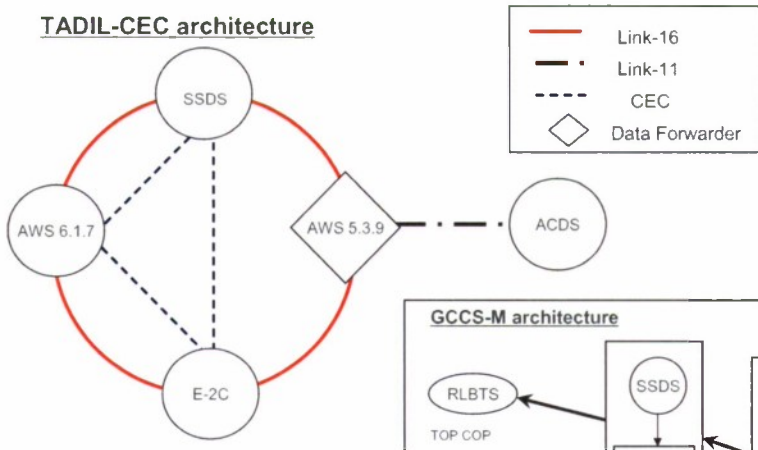
CNA

Test Case 4

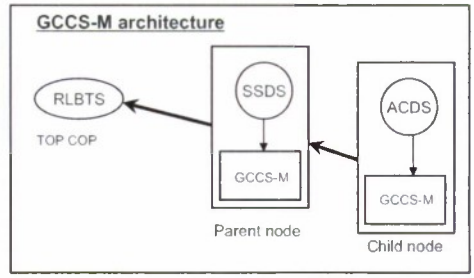
CNA

Test case 4. Maritime Reporting

TADIL-CEC architecture



GCCS-M architecture



CNA

Test case 4. Maritime Reporting

Configuration Matrix

Test case 4		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/D
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	E	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable

CNA

Test case 4. Maritime Reporting (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																			
		Mutual Tracking							Surveillance Track Reporting						Identification						
			Correlation		TN MGMT	SIAP			Tracking	Translation and Data Forwarding		Track Quality	Track MGMT	Track Attribute Association	ID			COO		SIAP	
		MT3	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4		ST7	ST13	ST14	ID2	ID4	ID5	ID7	ID5	ID12	ID13
Test Case 4: Maritime Reporting	1. Examine the ability of the SG to track and report the maritime situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CS1 and LINK networks.					I	I	I												I	
	2. Verify the ability of the SG to properly filter air and surface tracks on GCCS-M network.																				
	3. Verify that the platform under test acting as Parent node is able to accept, disseminate, and update surface tracks to the TOP COP based on assigned reporting sectors and missions.																				
	4. Verify that the platform under test acting as parent node is able can support the CTP manager's ability to properly fuse surface track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more than one unit is assigned as Link Input Ship.																				
	5. Verify SUW Force Order engagement and weapons status indications across TADIL networks.																				

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 4. Maritime Reporting (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 4: Maritime Reporting	1. Examine the ability of the SG to track and report the maritime situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks.				D		
	2. Verify the ability of the SG to properly filter air and surface tracks on GCCS-M network.				D		
	3. Verify that the platform under test acting as Parent node is able to accept, disseminate, and update surface tracks to the TOP COP based on assigned reporting sectors and missions.				D		
	4. Verify that the platform under test acting as parent node is able can support the CTP manager's ability to properly fuse surface track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more than one unit is assigned as Link Input Ship.				D		
	5. Verify SUW Force Order engagement and weapons status indications across TADIL networks.					D**	D**
** NON-DEP ICC Master list requirements							

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

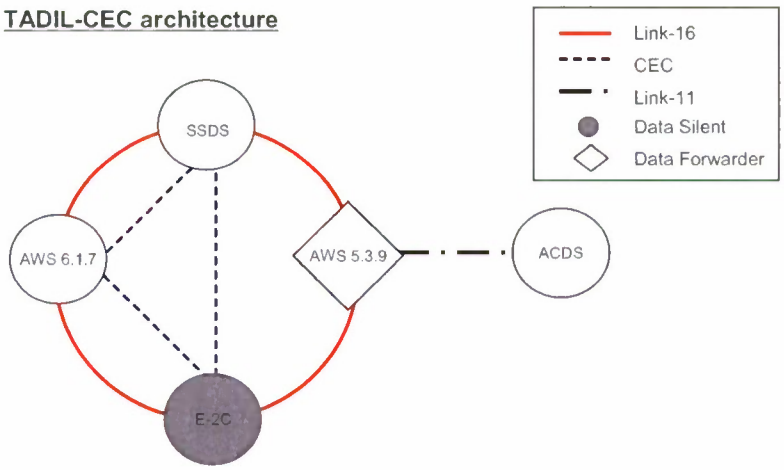
CNA

Test Case 5

CNA

Test case 5. SIAP Assessment 1

TADIL-CEC architecture



CNA

Test case 5. SIAP Assessment 1

Configuration Matrix

Test case 5		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	DS	D	D	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable DS = Data Silent

CNA

Test case 5. SIAP Assessment 1 (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																		
		Mutual Tracking						Surveillance Track Reporting					Identification							
			Correlation		TN MGMT	SIAP		Tracking	Transmission and Data Processing	Track Quality	Track MGMT	Track Attribute Association	ID			COID		SIAP	
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID2	ID4	ID5	ID7	ID8	CH3	CH5
Test Case 5 SIAP Assessment 1	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1 Assist in root-causing E2C (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

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CNA

Test case 5. SIAP Assessment 1 (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Blt IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 5: SIAP Assessment 1	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1. Assist in root-causing E2C (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D			

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

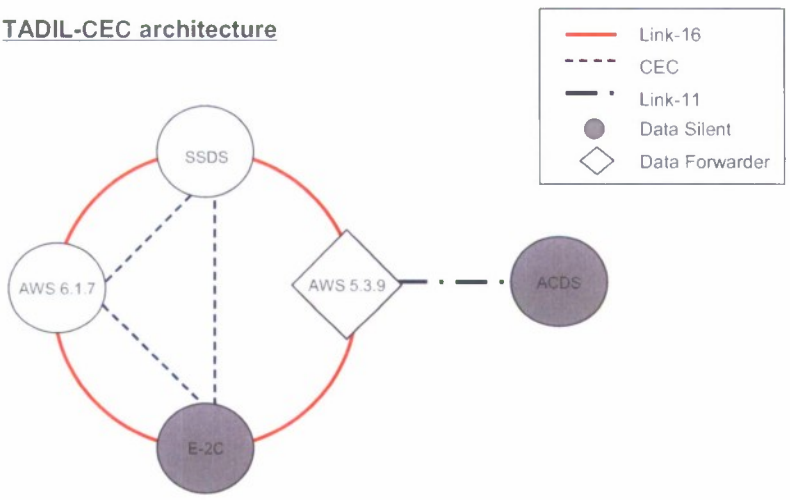
CNA

Test Case 6

CNA

Test case 6. SIAP Assessment 2

TADIL-CEC architecture



CNA

Test case 6. SIAP Assessment 2

Configuration Matrix

Test case 6		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	D	A	D	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	A	A	D	N/A	E	E	D	E	E
ACDS	5	DS	D	D	N/A	D	D	E	D	E
E-2C	5	D	DS	D	D	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable DS = Data Silent

CNA

Test case 6. SIAP Assessment 2 (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																		
		Mutual Tracking						Surveillance Track Reporting					Identification							
			Correlation	TN MGMT	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MGMT	Track Attribute Association	ID			CDO		SIAP	
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID2	ID4	ID6	ID7	ID5	ID12	ID13
Test Case 6: SIAP Assessment 2	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1. Assist in root-causing E2C (Data Silent) and Block 0 (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 6. SIAP Assessment 2 (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 6: SIAP Assessment 2	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1. Assist in root-causing E2C (Data Silent) and Block 0 (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D			

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

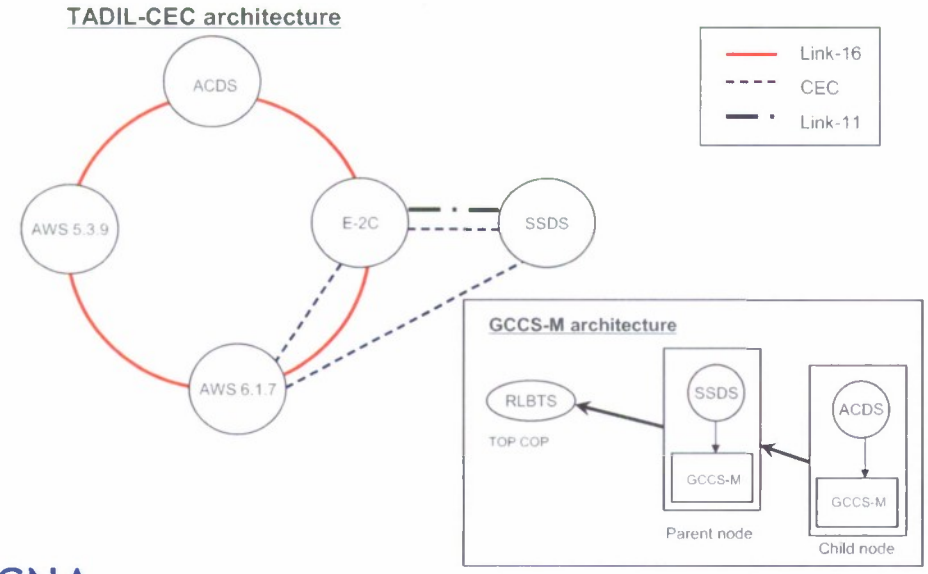
Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test Case 7

CNA

Test case 7. Concurrent OP 1 (Link)



CNA

Test case 7. Concurrent OP 1 (Link)

Configuration Matrix

Test case 7		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	A	D	D	E	D	D	E	E	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	D	E
AWS 5.3.9	11	D	A	D	N/A	E	E	D	E	E
ACDS	5	D	A	D	N/A	D	D	E	D	E
E-2C	5	A	A	D	D	D	N/A	E	D	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable DS = Data Silent

CNA

Test case 7. Concurrent OP 1 (Link) (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																		
		Mutual Tracking						Surveillance Track Reporting					Identification							
		Correlation		TN M/SMT	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track M/SMT	Track Attribute Association	ID			CDO		SIAP	
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID2	ID4	ID6	ID7	ID8	ID12	ID13
Test Case 7: Concurrent Ops 1	1. NUBC messages from the data forwarder																			
	5. Verify whether Model II C2P units overwrite high TN tracks when assigned DF role. If track block is overwritten, what is it replaced with?																			
	6. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CBT when Parent and Child nodes are operating on the two disparate data link networks within the same area of operation.																			
	7. Verify that the platform under test acting as Child node is able to disseminate and update tracks to the Parent node based on assigned reporting sectors and missions.																			
	8. Examine the ability of the platform under test Child node to support the CTP Manager's ability to properly fuse air track data when Parent and Child nodes are operating on two disparate data link networks within the same area of operation.																			
	Can not be tested in final test procedures																			

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 7. Concurrent OP 1 (Link) (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force Coordination	
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 7. Concurrent Ops 1	4. [illegible]						
	5. [illegible]						
	6. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST when Parent and Child nodes are operating on the two disparate data link networks within the same area of operation.				D		
	7. Verify that the platform under test acting as Child node is able to disseminate and update tracks to the Parent node based on assigned reporting sectors and missions.				D		
	8. Examine the ability of the platform under test Child node to support the CTP Manager's ability to properly fuse air track data when Parent and Child nodes are operating on two disparate data link networks within the same area of operation.				D		
	Can not be tested in final test procedures.						

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

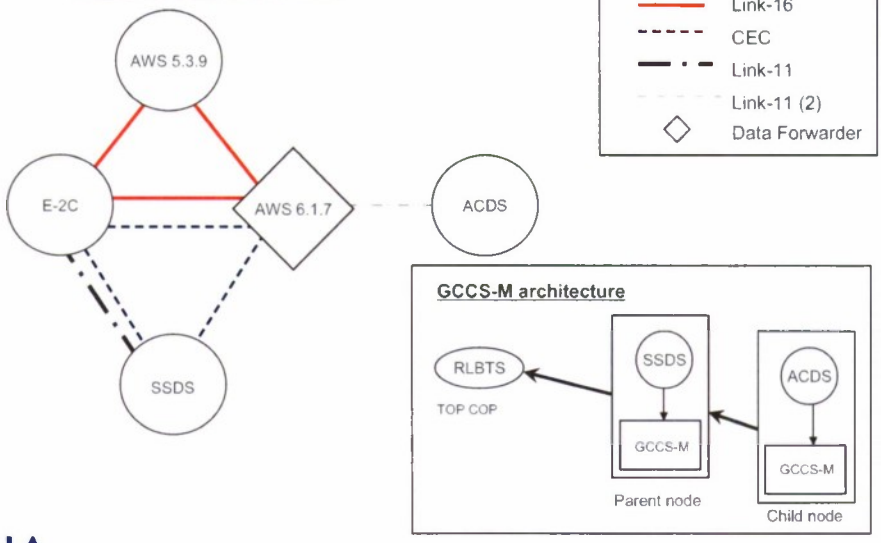
CNA

Test Case 8

CNA

Test case 8. Concurrent OP 2

TADIL-CEC architecture



CNA

Test case 8. Concurrent OP 2

Configuration Matrix

Test case 8		Link Status							Correlation		Test case 6
Platform	DTQ	L-11	L-11 (2)	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	A	D	D	D	E	D	D	E	E	D/O
AWS 6.1.7	5	D	A	A	D	E	D	D	E	D	E
AWS 5.3.9	11	D	D	A	D	N/A	E	E	D	E	E
ACDS	5	D	A	D	D	N/A	D	D	E	D	E
E-2C	5	A	D	A	D	D	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable DS = Data Silent

CNA

Test case 8. Concurrent OP 2 (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																			
		Mutual Tracking						Surveillance Track Reporting					Identification								
		Correlation		TN MGMT	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MGMT	Track Attribute Association	ID			CDO		SIAP			
		MT5	MT6	MT7	MT10	MT11	MT12	MT15	ST2	ST4	ST7	ST13	ST16	ID2	ID4	ID5	ID2	ID6	ID12	ID13	
Test Case 8 Concurrent Ops 2	1. Examine the ability of the SG with a concurrent unit to maintain CTP.	D	D	D	D	D	D	D	D		D		D	D					D	D	
	2. Identify the failure mechanisms such as dual tracks and TN mismatches that occur when ships operate with concurrent units and assess the impact to the SG.	D	D	D	D	D	D	D	D			I									
	3. Verify C&D CPR U2969 on AWS 5.3.9: Does not display low TNs associated by DF with High TNs when own ship operates on Link-16 only.							D													
	4. Verify Model 5 platforms on Link-11 only display the high TN received in M.9E message from the data forwarder.							D		D											
	5. Verify whether Model 5 C2P units overwrite high TN block when assigned DF role. If track block is overwritten, what is it replaced with?																				

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 8. Concurrent OP 2 (2 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 8. Concurrent Ops 2	1. Examine the ability of the SG with a concurrent unit to maintain CTP.			I			
	2. Identify the failure mechanisms such as dual tracks and TN mismatches that occur when ships operate with concurrent units and assess the impact to the SG.						
	3. Verify C&D CPR U2969 on AWS 5.3.9: Does not display low TNs associated by DF with High TNs when own ship operates on Link-16 only.						
	4. Verify Model 5 platforms on Link-11 only display the high TN received in M.9E message from the data forwarder.						
	5. Verify whether Model 5 C2P units overwrite high TN block when assigned DF role. If track block is overwritten, what is it replaced with?						

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

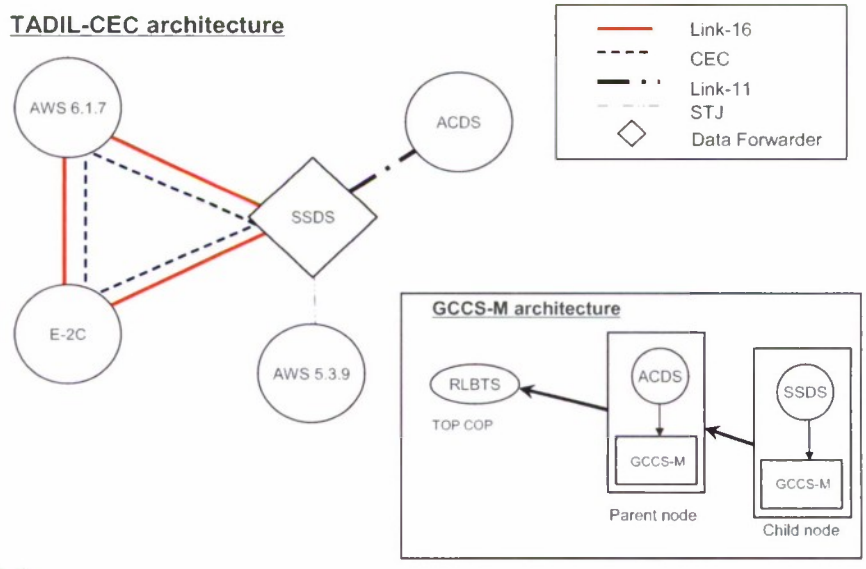
Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test Case 9

CNA

Test case 9. SSDS Data Forwarding



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Test case 9. SSDS Data Forwarding

Configuration Matrix

Test case 9		Link Status							Correlation	
Platform	DTQ	L-11	L-16	STJ	CEC DDS	DF	L-11 TN ASSIGN	TPF	GRU	BFCC
SSDS	8	A	A	A	E	D	D	E	D	D/O
AWS 6.1.7	5	D	A	D	E	D	D	E	E	E
AWS 5.3.9	11	D	D	A	N/A	E	E	E	D	E
ACDS	5	A	D	D	N/A	D	D	E	D	E
E-2C	5	D	A	D	D	D	N/A	E	N/A	E

A = Active D = Disabled D/O = Default On E = Enabled N/A = Not Applicable DS = Data Silent

CNA

Test case 9. SSDS Data Forwarding (1 of 2)

ICC Requirements Trace

Test Case	Objectives	DEP SPECIFIC ICC Master Requirements																			
		Mutual Tracking							Surveillance Track Reporting					Identification							
		Correlation		TN MOART	SIAP			Tracking	Translation and Data Forwarding	Track Quality	Track MOART	Track Attribute Association	ID			CDO		SIAP	
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST4	I02	I04	I06	I07	I06	I012	I013
Test Case 9 SSDS Data Forwarding	1. Examine the CTP of a SG when SSDS is operating as DF link 16, Link 11, and STJ							D	D	D											
	2. Identify differences in situational awareness link units operating on separate networks				I			D													
	3. Observe any issues when a SG operates with older SGB/AC versions and 9.0.7.5 concurrently	D	D	D						D									D	D	
	4. Verify SSDS 30 second lockout for CDO commands are corrected at CDLMS and SSDS																	D			
	5. Observe accurate AAW Force Order engagement and weapons status indications btw TADIL networks																				
	6. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-11 data from the Passive Link Tap (PLT) interface																				
	7. Observe any differences when GCCS-M uses PLT vs. MTC interface input at the SSDS platform by comparing with non-PLT input																				

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA

Test case 9. SSDS Data Forwarding (2 of 2)

ICC Requirements Trace

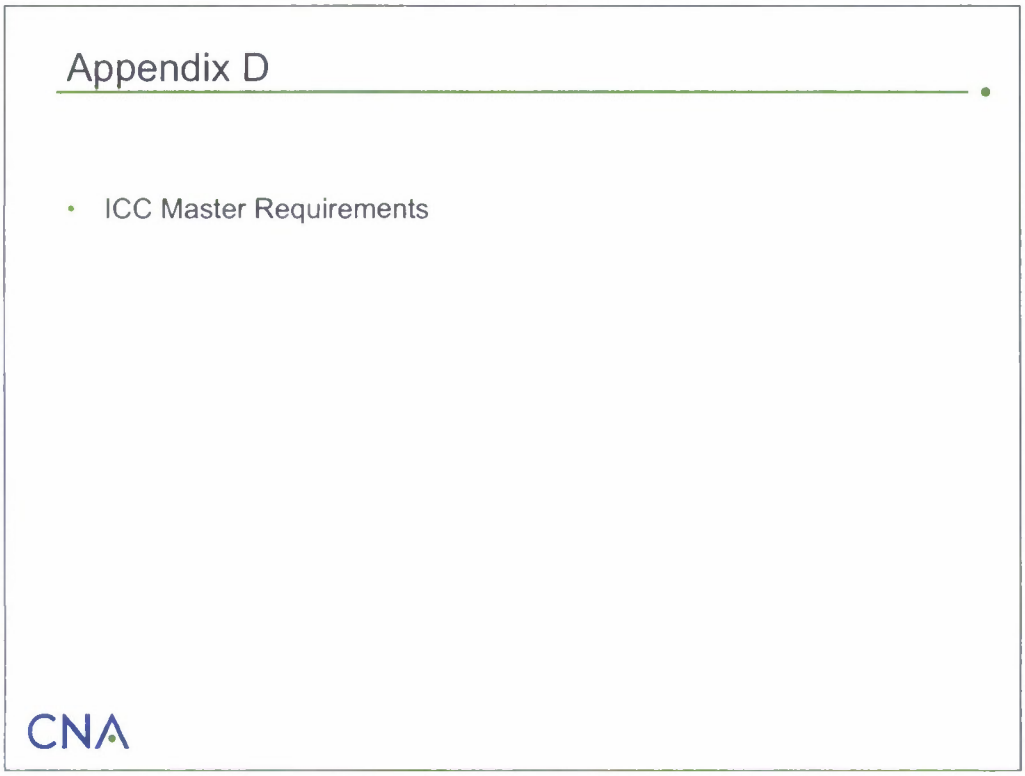
Test Case	Objectives	DEP Specific Requirements				NON-DEP Specific Requirements	
		Friendly Deconfliction				Force	Coordination
		12/15/19 Bit IU Mgmt			GCCS	Engagement Coordination	Engagement Status
		FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 9. SSDS Data Forwarding	1. Examine the CTP of a SG when SSDS is operating as DF b/w Link-16, Link 11, and STJ.	D					
	2. Identify differences in situational awareness b/w units operating on separate networks.						
	3. Observe any issues when a SG operates with older SGS/AC versions and 6.0.7.5 concurrently.						
	4. Verify SSDS 30 second lockout for CDO commands are corrected at CDLMS and SSDS.						
	5. Observe accurate AAW Force Order engagement and weapons status indications b/w TADIL networks.					D**	D**
	6. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-11 data from the Passive Link Tap (PLT) interface.				D		
	7. Observe any differences when GCCS-M uses PLT vs. MTC interface input at the SSDS platform by comparing with non-PLT input.				D		

** NON-DEP ICC Master list requirements

Direct (D) – data collected to support a specific test case/objective can be used directly to address whether a requirement has been met

Indirect (I) – data collected to support a specific test case/objective, when combined with other data from a DEP test or other sources may be used to address whether a requirement has been met

CNA



This appendix contains the set of requirements from the ICC Master Requirements list that pertain to DEP testing. We list high level Functions, Subfunctions, and specific Functional Requirements. The following three slides list the ICC master requirements relevant to the DEP as determined by the ICC Requirements Lead. These interoperability requirements are derived from multiple sources. At the end of the list, we identified two additional ICC requirements that are not DEP-specific but can be tested in the DEP environment.

DEP Specific ICC Master Requirements

DEP SPECIFIC ICC Master Requirments		
Function	**Subfunction**	**Functional Requirement**
Mutual Tracking MT-DEP	**Correlation**	**MT5** - Demonstrate the capability to perform automatic air and surface correlation processing.
		MT6 - Demonstrate correct J7.2/M9B processing (for unit under test).
		MT7 - Demonstrate correct decorrelation processing.
	TN Management	**MT10** - Verify each CEPN is associated with one and only one local track (CTSL) and one end only one Link track (LTN) at eny given time.
	SIAP	**MT11** - Evaluate capability of platform when operating with the Strike Force to maintain e single track per object (SIAP Clerity).
		MT12 - Evaluate capability of platform when operating with the Strike Force to maintain a continuous LTN and CEPN (SIAP Continuity).
		MT13 - Evaluate capability of pletform when operating with the Strike Force to maintain a common picture such that the tracks held by each participant have the same LTN, LTN/CEPN pairing, ID, position, on the seme object (SIAP Commonality).

CNA

DEP Specific ICC Master Requirements

DEP SPECIFIC ICC Master Requirments		
Function	**Subfunction**	**Functional Requirement**
Surveillance Track Reporting STR-DEP	**Tracking**	**ST2** - Verify capability to trensmit end receive surveillance data on ell track types. (J messages) Verify proper periodicity of surveillance track reporting on LINK16 and LINK11. Verify entire track block is used before reuse of a LTN. a. Verify that tracks received via LINK11 or LINK16 are displayed to the operator end stored in the combat system. b. Verify that tracks via LINK11/16 can be called up (hooked) by LTN. c. Verify that all local tracks eligible for link transmission ere being transmitted assuming TNs ere available.
	Translation and Data Forwerding	**ST4** - Verify that all PPLI, surveillance, track management and force status messages end ell references to IUs are properly translated end forwarded from LINK 11 to LINK16, vice versa, and LINK16 to S-TADILJ (includes 12, 15, and 19 bit LTN).
	Track Quality	**ST7** - Verify capability to determine horizontal positional accuracy for a circular area such that there is a 95% probability that the target is within the determined area at the time of the track report. Verify that the platform does not artificially increase or decrease TQ so that track correlation gates are accurately determined. Verity accurate and consistent TQ reporting over the LINK. Verify proper decrement of TQ.
	Treck Management	**ST13** - Verify CEPN/LTN pairing consistency across all Cus.
	Track Attribute Association	**ST14** - Verify that track ettributes (TN, IFF, ID) ere correctly associated and maintained on each object of interest.

CNA

DEP Specific ICC Master Requirements

DEP SPECIFIC ICC Master Requirments		
Function	**Subfunction**	**Functional Requirement**
Identification ID-DEP	**ID**	**ID2** - Varify that ID diffaranca protocols are processed at tha forca laval (ex. ID conflict pending, subsaquant ID conflict raceived whila panding)
		ID4 - Varify that CEC units can exchange and operate with COMP ID doctrina.
		ID5 - Varify that CEC/LINK ID feedback loop design issue does not prevent proper ID managamant
	CDO	**ID7** - Varify that "force order" and "change data order" actions results in CDO messagas sant on both LINK and CEC
		ID8 -Varify tha combat systam will not accept any ID changas for 30 seconds aftar receipt of a CDO
	SIAP	**ID12** - Evaluata capability of tha platform whan operating with the Strika Force to astablish and maintain an accurata ID for aach trackad object (SIAP ID accuracy)
		ID13 - Evaluata capability of the platform whan operating with the Strike Force to maintain a clear ID for each object such that the object is not labaled with conflicting ID statas. (SIAP ID clarity)
Friendly Force Deconfliction FD-DEP	**12/15/19 Bit IU Mgmt**	**FD2** - Varify correct racaipt and display at combat systam of C2 and Non-C2 PPLI reports (J2.2,2.3,2.4) including 4 and 5 digit PPLIs
		FD4 - Varify that no ID or IFF diffarances are issuad against C2 or Non-C2 PPLI reports
		FD6 - Verify translation of 12, 15 and 19 bit formats of Pus and Pus used as LTNs.
NON-DEP SPECIFIC ICC Master Requirements		
Force Coordination FC-NONDEP	**Engagement Coordination**	**FC1** - Varify proper transmission, recaipt, and display of J9.0 command massages
	Engagement Status	**FC3** - Verify proper transmission, receipt and display of J10.2 angagamant status.

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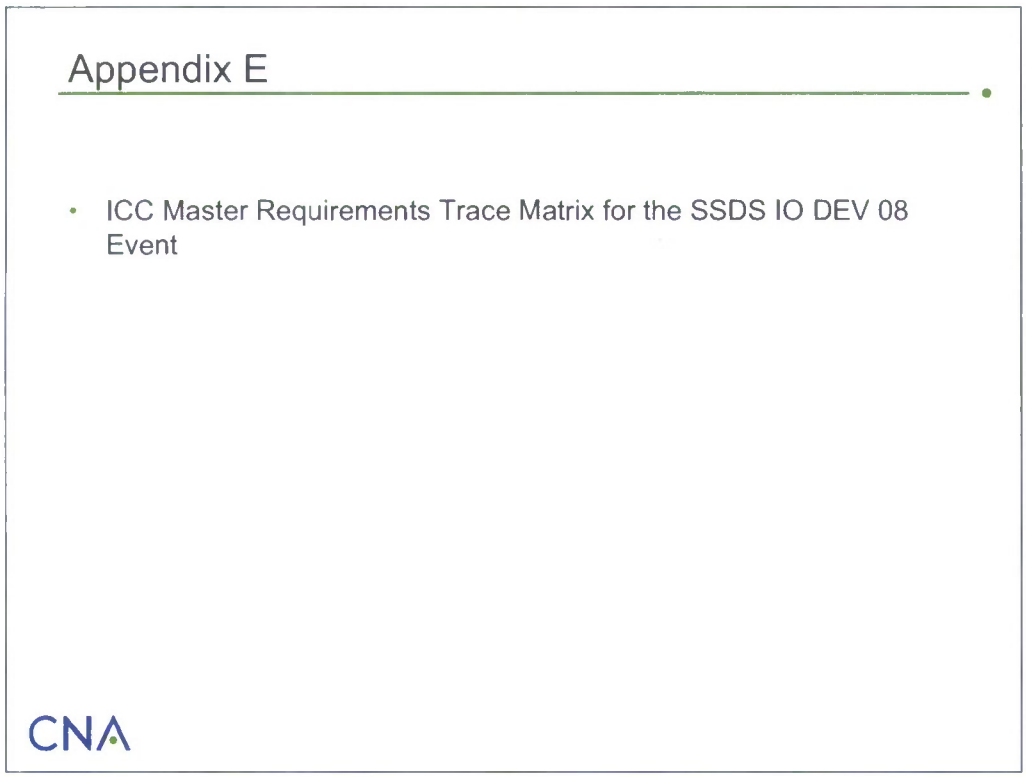
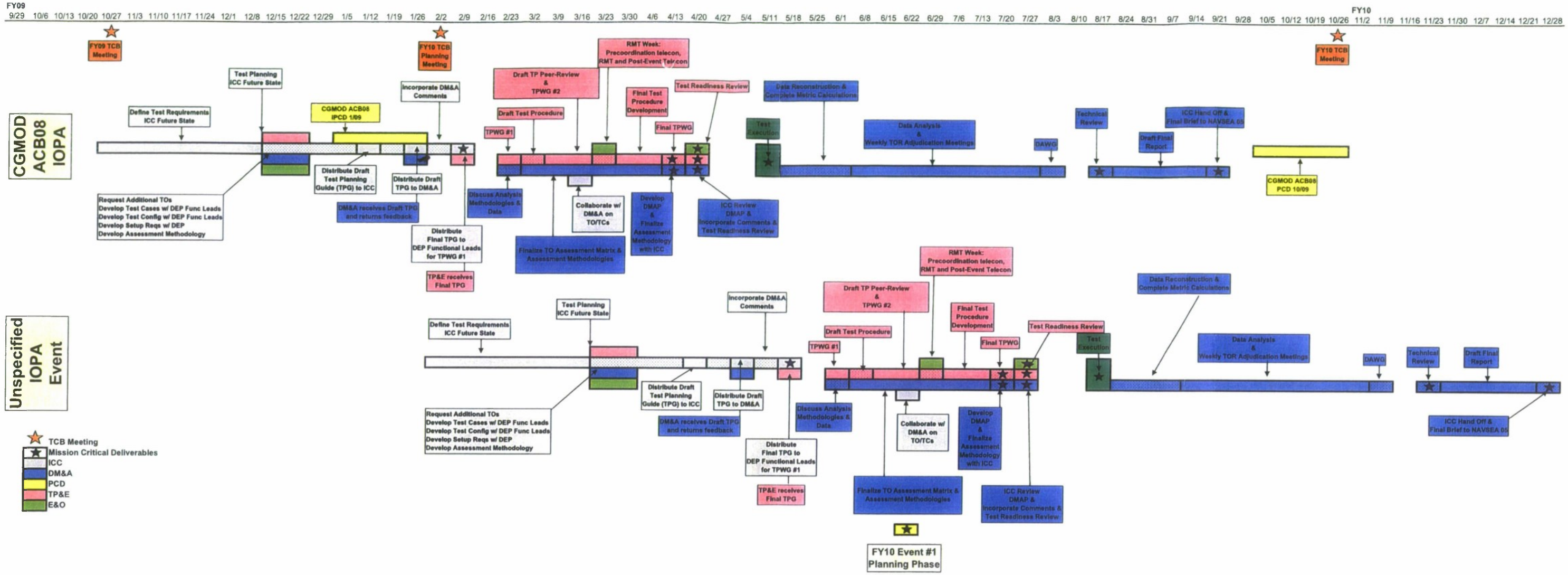


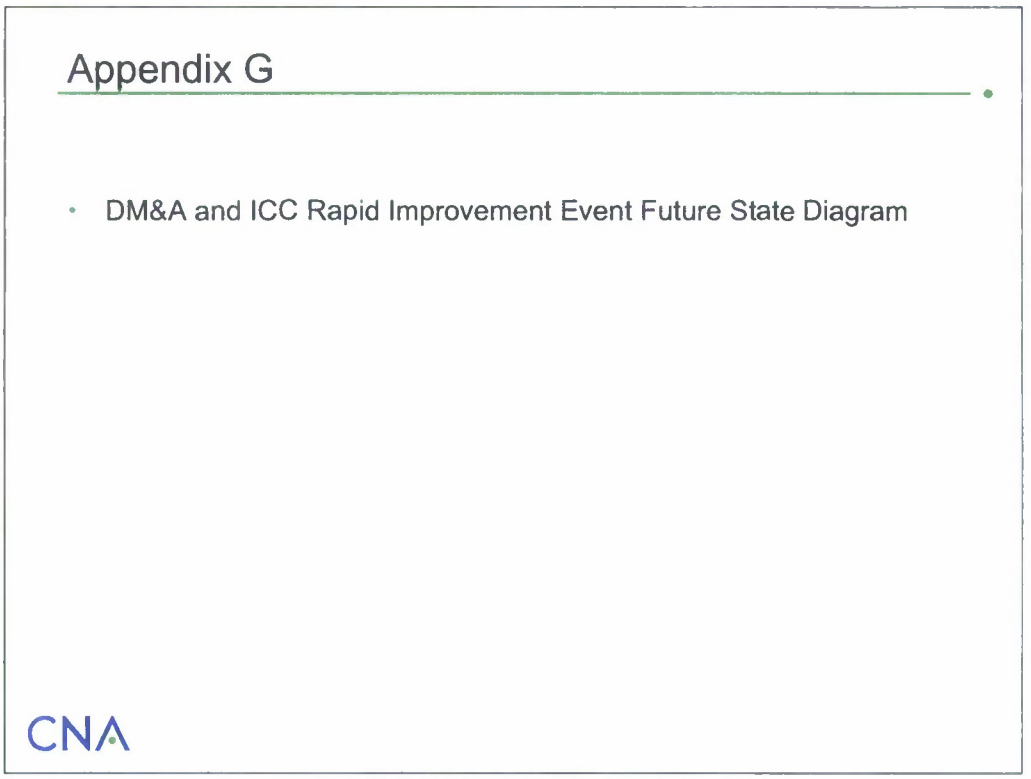
This appendix contains the entire example requirements trace matrix created during the BUR for the SSDS IO DEV 08 event.

Test Case	Objectives	DEP SPECIFIC ICC Master Requirments																										NON-DEP SPECIFIC ICC REQUIREMENTS	
		Correlation			Mutual Tracking: TN MGMT	Mutual Tracking: SIAP			Surveillance Track Reporting: Tracking	Surveillance Track Reporting: Translation and Data Forwarding	Surveillance Track Reporting: Track Quality	Surveillance Track Reporting: Track MGMT	Surveillance Track Reporting: Track Attribute Association	Identification: ID			Identification: C DO		Identification: SIAP		Friendly Deconfliction: 12/15/19 Bit IU Mgmt			GCCS	GCCS	Force Engagement Coordination	Coordination Engagement Status
		MT5	MT6	MT7	MT10	MT11	MT12	MT13	ST2	ST4	ST7	ST13	ST14	ID2	ID4	ID5	ID7	ID8	ID12	ID13	FD2	FD4	FD6	GCCS	FC1	FC3
Test Case 1: Test Strike Group	1. Compare SIAP results to RSG.					D	D	D		I		I	I						D	D			I				
	*2. Verify the ability of SSDS to operate within the representative SG.																										
	3. Verify the SSDS is able to operate with High TN IU units and other interoperability fixes based on SSDS and CDLMS VDDs or fix lists.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
	4. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks					I	I	I											I	I				D			
	5. Verify that the platform under test acting as Parent node is able to disseminate and update air tracks to the TOP COP based on assigned reporting sectors and missions.																							D			
	6. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse air track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship.																							D			
	7. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-16 data from ADSI via the MTC interface.																							D			
Test Case 2: Test Strike Group with SGS 6.0.7.5	1. Compare SIAP results from the RSG and TSG 1 with TSG 2 assess any differences in performance based on the incorporation of SGS/AC 6.0.7.5 at SSDS, AWS 5.3.9 and AWS 6.1.7 Differences b/w the groups and any anomalies from observation or data will be used to queue detailed analysis.					D	D	D		I		I	I						D	D			I				
	2. Verify correlation/decorrelation processing and other improvements based on the SGS VDD or applicable fix list.	D	D	D		I	I	I											I	I							
	3. Verify that the platform under test acting as Parent node can support the CTP Manager's ability to properly fuse air track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more than one unit is assigned as Link Input Ship.																							D			
Test Case 3: RSG	1. Compare SIAP results to TSG 1 and 2.					D	D	D		I		I	I						D	D			I				
	2. Examine the ability of AWS 5.3.9 baseline w/ CDLMS 3.4.4.2-4 to operate w/ the representative Strike Group. AWS 5.3.9 will be operating with a new version of CDLMS that includes corrections to Hi/Lo TN management								D	D		I	I								D	I					
	3. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks					I	I	I											I	I				D			
	4. Verify that the platform under test acting as FOTC can properly fuse air track data from participant nodes and report/update tracks to the TOP COP based on specified mission requirements when only one unit is assigned as Link Input Ship.																							D			
	5. Determine any differences between GCCS-M COPs when operating in CTP Manager and FOTC modes by comparing TSG 1 and RSG.																							D			
Test Case 4: Maritime Reporting	1. Examine the ability of the SG to track and report the maritime situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST and LINK networks.					I	I	I											I	I				D			
	2. Verify the ability of the SG to properly filter air and surface tracks on GCCS-M network																							D			
	3. Verify that the platform under test acting as Parent node is able to accept, disseminate, and update surface tracks to the TOP COP based on assigned reporting sectors and missions.																							D			
	4. Verify that the platform under test acting as parent node is able can support the CTP manager's ability to properly fuse surface track data from child nodes and report/update tracks to the TOP COP based on specified mission requirements when more than one unit is assigned as Link Input Ship.																							D			
	5. Verify SUW Force Order engagement and weapons status indications across TADIL networks.																								D	D	
Test Case 5: SIAP Assessment 1	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1. Assist in root-causing E2C (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
Test Case 6: SIAP Assessment 2	1. Calculate SIAP metrics to use as a reference to compare results b/w this test case and TSG 1. Assist in root-causing E2C (Data Silent) and Block 0 (Data Silent) track reporting issues observed during previous interoperability certification test events.	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D				
Test Case 7: Concurrent Ops 1	1. Examine the ability of the SG with a concurrent unit to maintain CTP.	D	D	D	D	D	D	D	D		D	I	D	D					D	D			I				
	2. Identify the failure mechanisms such as dual tracks and TN mismatches that occur when ships operate with concurrent units and assess the impact to the SG.	D	D	D	D	D	D	I	D			I	D														
	3. Verify C&D CPR U2969: Does not display low TNs associated by DF with High TNs when own ship operates on Link-16 only.																										
	4. Verify Model 5 platforms on Link-11 only display the high TN received in M.9E message from the data forwarder.																										
	5. Verify whether Model 5 C2P units overwrite high TN block when assigned DF role. If track block is overwritten, what is it replaced with?																										
	6. Examine the ability of the SG to track and report the AAW situational awareness and CTP for the SG's AOR to the COP via GCCS-M/CST when Parent and Child nodes are operating on the two disparate data link networks within the same area of operation.																							D			
	7. Verify that the platform under test acting as Child node is able to disseminate and update tracks to the Parent node based on assigned reporting sectors and missions.																							D			
	8. Examine the ability of the platform under test Child node to support the CTP Manager's ability to properly fuse air track data when Parent and Child nodes are operating on two disparate data link networks within the same area of operation.																							D			
Test Case 8: Concurrent Ops 2	1. Examine the ability of the SG with a concurrent unit to maintain CTP.	D	D	D	D	D	D	D	D		D		D	D					D	D			I				
	2. Identify the failure mechanisms such as dual tracks and TN mismatches that occur when ships operate with concurrent units and assess the impact to the SG.	D	D	D	D	D	D	D	D			I	D														
	3. Verify C&D CPR U2969 on AWS 5.3.9: Does not display low TNs associated by DF with High TNs when own ship operates on Link-16 only.							D																			
	4. Verify Model 5 platforms on Link-11 only display the high TN received in M.9E message from the data forwarder.							D		D																	
	5. Verify whether Model 5 C2P units overwrite high TN block when assigned DF role. If track block is overwritten, what is it replaced with?																										
Test Case 9: SSDS Data Forwarding	1. Examine the CTP of a SG when SSDS is operating as DF b/w Link-16, Link 11, and STJ.							D	D	D											D						
	2. Identify differences in situational awareness b/w units operating on separate networks.				I			D																			
	3. Observe any issues when a SG operates with older SGS/AC versions and 6.0.7.5 concurrently.	D	D	D						D									D	D							
	4. Verify SSDS 30 second lockout for CDO commands are corrected at CDLMS and SSDS.																	D									
	5. Observe accurate AAW Force Order engagement and weapons status indications b/w TADIL networks.																								D	D	
	6. Verify the GCCS-M at the SSDS platform under test properly receives and processes Link-11 data from the Passive Link Tap (PLT) interface.																							D			
	7. Observe any differences when GCCS-M uses PLT vs. MTC interface input at the SSDS platform by comparing with non-PLT input.																							D			

* Overall DEP test objective (not connected with specific ICC requirments)
** NON-DEP ICC Master list requirements
Can not be tested in final test procedures.

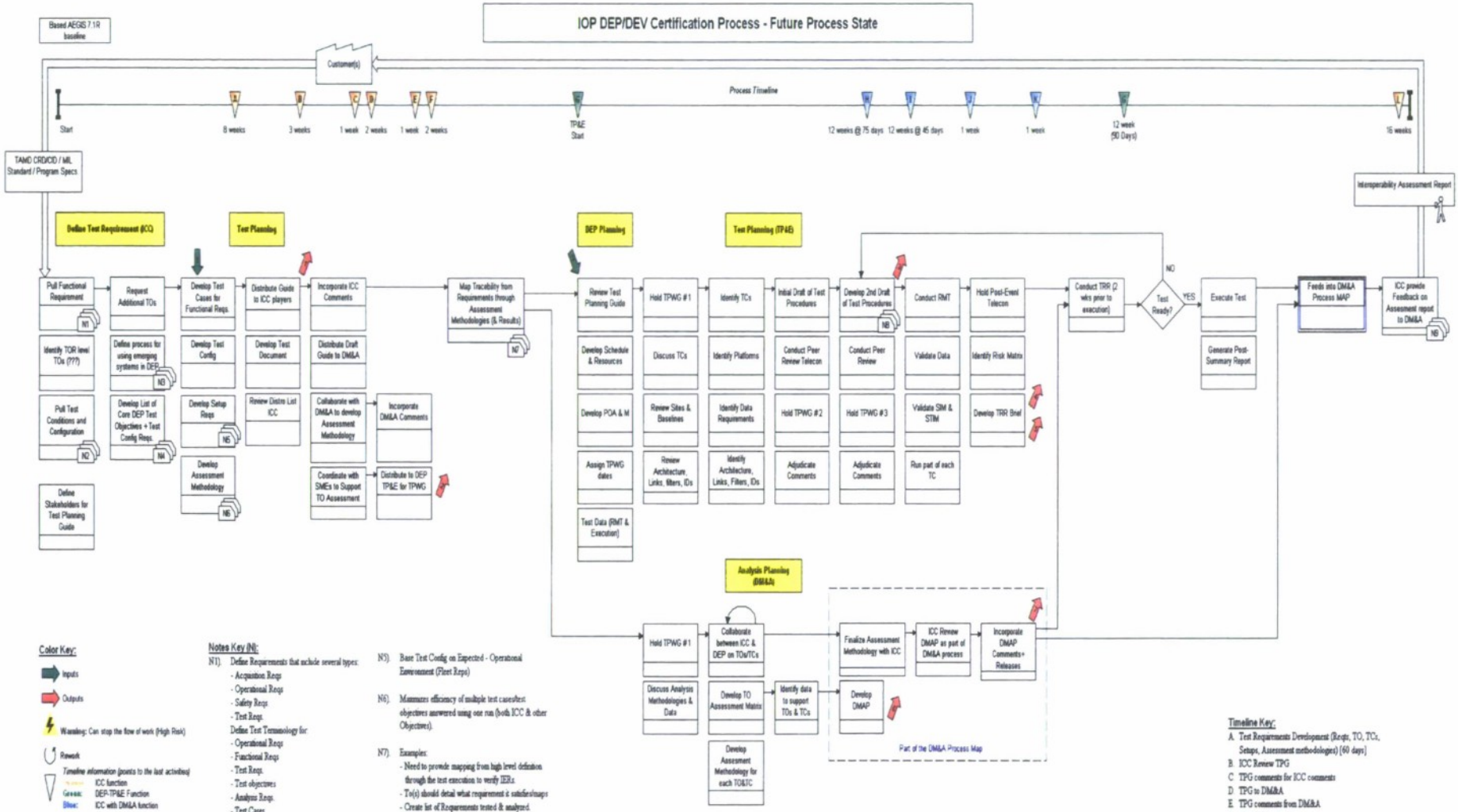
This appendix contains a detailed FY09 DEP Future State timeline for multiple events on a single sheet.


FY09
9/29 10/6 10/13 10/20 10/27 11/3 11/10 11/17 11/24 12/1 12/8 12/15 12/22 12/29 1/5 1/12 1/19 1/26 2/2 2/9 2/16 2/23 3/2 3/9 3/16 3/23 3/30 4/6 4/13 4/20 4/27 5/4 5/11 5/18 5/25 6/1 6/8 6/15 6/22 6/29 7/6 7/13 7/20 7/27 8/3 8/10 8/17 8/24 8/31 9/7 9/14 9/21 9/28 10/5 10/12 10/19 10/26
FY10
11/2 11/9 11/16 11/23 11/30 12/7 12/14 12/21 12/28
CGMOD ACB08 IOPA
FY09 TCB Meeting
FY10 TCB Planning Meeting
FY10 TCB Meeting
Define Test Requirements ICC Future State
Test Planning ICC Future State
CGMOD ACB08 IPCD 1/09
Incorporate DM&A Comments
Draft TP Peer-Review & TPWG #2
RMT Week: Precoordination telecon, RMT and Post-Event Telecon
Test Readiness Review
Data Reconstruction & Complete Metric Calculations
Technical Review
ICC Hand Off & Final Brief to NAVSEA 05
Draft Final Report
CGMOD ACB08 PCD 10/09
Draft Test Procedure
Final Test Procedure Development
TPWG #1
Final TPWG
Test Execution
Data Analysis & Weekly TOR Adjudication Meetings
DAWG
Request Additional TOs
Develop Test Cases w/ DEP Func Leads
Develop Test Config w/ DEP Func Leads
Develop Setup Reqs w/ DEP
Develop Assessment Methodology
Distribute Draft Test Planning Guide (TPG) to ICC
Distribute Draft TPG to DM&A
DM&A receives Draft TPG and returns feedback
Discuss Analysis Methodologies & Data
Collaborate w/ DM&A on TO/TCs
Develop DMAP & Finalize Assessment Methodology with ICC
ICC Review DMAP & Incorporate Comments & Test Readiness Review
Distribute Final TPG to DEP Functional Leads for TPWG #1
TP&E receives Final TPG
Finalize TO Assessment Matrix & Assessment Methodologies
Unspecified IOPA Event
TCB Meeting
Mission Critical Deliverables
ICC
DM&A
PCD
TP&E
E&O
FY10 Event #1 Planning Phase



This appendix includes the DM&A and ICC Rapid Improvement Event's Future State process diagram.

IOP DEP/DEV Certification Process - Future Process State



Color Key:

- Inputs
- Outputs
- Warning: Can stop the flow of work (High Risk)
- Rework
- *Timeline information (points to the last activities)*
- ICC function
- Green: DEP-TP&E Function
- Blue: ICC with DM&A function

Input Key:

1). Incorporate lessons learned from DM&A & TP&E
2). TPG from ICC

Output Key:

1). Send TPG to ICC members
2). Send TPG to DEP-TP&E
3). Send Test Procedures
4). Forward TRR Brief to DEP
5). Send Final Test Procedures Changes
6). Send DMAP to ICC
7). Send DMAP to DEP & ICC

Notes Key (N):

N1). Define Requirements that include several types:
- Acquisition Reqs
- Operational Reqs
- Safety Reqs
- Test Reqs.

Define Test Terminology for:
- Operational Reqs
- Functional Reqs
- Test Reqs.
- Test objectives
- Analysis Reqs.
- Test Cases

N2). Need list of element changes/functionalities prior to Test Planning from developers.

N3). Perform Data Call for latest versions such as CDLMS, CEC, SGS, CAP, etc.

N4). Ex: 11 Functional
- Put as GEU
- Put as DF

Include safety info
Include Assessment Resp (KEF,SG, TSG).

N5). Base Test Config on Expected - Operational Environment (Fleet Reps)

N6). Maximizes efficiency of multiple test cases/test objectives answered using one run (both ICC & other Objectives).

N7). Examples:
- Need to provide mapping from high level definition through the test execution to verify IERs.
- To(s) should detail what requirement it satisfies/maps
- Create list of Requirements tested & analyzed. Provides trace & could be part of metrics set.

N8). Draft Test Procedures
Stakeholders:
- ICC
- DM&A
- SMEs
- Timeframe: 5-7 Business days for review

N9). DM&A to Provide Test feedback to ICC on:
- What worked well
- What did not work out
- Lessons learned

Timeline Key:

A. Test Requirements Development (Reqts, TO, TCs, Setups, Assessment methodologies) [60 days]
B. ICC Review TPG
C. TPG comments for ICC comments
D. TPG to DM&A
E. TPG comments from DM&A
F. TPG to TP&E
G. TPWG and Site Schedules
Note: ICC Must participate throughout the DEP process to ensure accuracy of the product
H. DM&A to Develop DMAP
I. Conduct DMAP peer review
J. ICC Review & comments
K. Submit 2nd Draft
L. IPCD / PCD (Final Build)